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OFF-SITE SAMPLING PLAN
MONTROSE SITE
TORRANCE, CALIFORNIA

HARGIS+ASSOCIATES, INC.
Consultants in Hydrogeology

HARGIS + ASSOCIATES, INC.

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INTRODUCTION

This Sampling Plan has been prepared to investigate the potential for off-site transport of chemicals from the Montrose site as part of the Remedial Investigation Work (RIW) being conducted at the site. Adherence to the methodology described herein will ensure that data of sufficient quality and quantity are collected and are representative of off-site conditions. The methodology will provide records of traceability, insure adherence to prescribed protocols, and assure that the data provide a basis from which sound conclusions can be drawn. This sampling plan, to be implemented during the off-site RIW field activities in the vicinity of the Montrose site, includes discussion of the following:

- Objectives of the sampling activities.
- Proposed sampling locations.
- Number and frequency of samples.
- Sampling equipment and methods of sample collection, preservation, and handling.
- Storage and shipping methods.
- Chain-of-custody procedures.
- Analytical methods.
- Site safety procedures.

Additional details on procedures and methods are described in the Quality Assurance Project Plan (QAPP)(Hargis + Associates, 1985). The Health and Safety Plan is contained in Appendix A.

HISTORICAL BACKGROUND

The Montrose site occupies about 13 acres in Torrance, California. The area is bounded by a railroad right of way and Normandie Avenue on the east, Jones Chemical Company and Los Angeles Department of Water and Power property to the south, a vacant lot to the west, and the McDonnell-Douglas facility to the north (Figure 1). The surrounding area consists of mixed residential, commercial, and industrial uses. In addition, the Del Amo hazardous waste site is located about one-half mile southeast of the Montrose site.

Between 1947 and 1982, Montrose Chemical Corporation operated a DDT manufacturing plant in Torrance, California. Although the use of DDT was banned in the United States in 1972, its use was not banned in other countries. Montrose continued to manufacture and export DDT until 1982, when the facility was closed and subsequently dismantled.

Previous investigations addressing the potential for migration of contaminants from the Montrose site include off-site sampling of sediments and surface runoff by the U.S. Environmental Protection Agency (EPA) and its contractors, California Department of Health Services (DOHS), and the Regional Water Quality Control Board, Los Angeles Region. An EPA investigation in November 1982 detected DDT in surface water runoff and sediments off-site of the Montrose property. The majority of data collected by public agencies with respect to the Montrose site has been summarized in two previous reports by EPA contractors: CERCLA Investigation, Montrose Chemical Corporation, Ecology & Environment, Inc., April, 1983; and Review of Proposed Response to EPA Enforcement Order No. 83-01, Metcalf & Eddy, Inc., November 1983.

Existing off-site soils data are useful in a general way, indicating possible ranges of DDT concentrations which may be found in further off-site work. The data may not be used in the formal RI/FS process and, in any case, only contain information on DDT. Analytical results from previous off-site sampling programs are summarized in Appendix B.

In June 1983 Montrose submitted a proposal for remedial action at the site. The same year Montrose constructed a temporary earthen berm to contain stormwater drainage, and thus prevent transportation of contaminated soil off-site. While the earthen berm was being constructed, consultants for Montrose Chemical Corporation drilled nine soil borings in the utility easement area and the area adjacent to the Farmer Brothers Coffee facility immediately south of the former facility to characterize off-site concentrations of chemical residues. The soils were sampled at varying depths and analyzed for DDT and its isomers (Hargis & Montgomery, Inc., 1983). In early 1985, the entire on-site area was graded and capped with asphalt so that no portion of the soil remained exposed. A concrete curb was constructed around the perimeter to minimize upgradient drainage entering the site. These actions have eliminated the possibility of air or water transport of soil off the site.

In October 1985 a consent order between the EPA and Montrose concerning the performance of additional investigative activities was finalized. The off-site RIW tasks, outlined in the EPA Remedial Investigation/Feasibility Study Final Workplan, Montrose Facility Site (Torrance, California), Metcalf and Eddy, Inc., October 1984 as modified by Appendix A of the consent order, are designed to obtain information necessary for the performance of a feasibility study. The RIW will be performed for Montrose Chemical Corporation under the direction and supervision of Hargis + Associates subject to the review and approval of the EPA. Metcalf and Eddy, Inc. will act as oversight personnel for the EPA.

SAMPLING OBJECTIVES

The objective of this sampling program is to determine the extent and level of off-site soil, sediment, and surface water contamination which may have resulted from activities at the Montrose site. An additional objective includes gathering data of sufficient quality to support the Feasibility Study. This will be assured by following the sampling protocols described in the QAPP. The quantity of data to be gathered is specified in Appendix A of the consent order. The objective is to obtain data that would be adequate to determine the level and extent of contamination so that response options and their cost effectiveness can be evaluated.

Consistent with this plan's subject matter and time objectives, a phased sampling plan has been developed for certain aspects of RIW. As described below, certain initial analytical results will be obtained and evaluated to determine whether additional data is needed. If more information is required, the initial data will be used as the technical basis for defining precisely the frequency and location of any additional sampling activities.

The Target Chemicals in this investigation, chosen by the EPA in an unreleased preliminary report of on-site soils analyses conducted in June, 1985, and verbally forwarded to Montrose at a meeting on January 21, 1986, are:

DDT (all isomers and metabolites DDD and DDE)
BHC (all isomers)
Monochlorobenzene
Dichlorobenzene
Benzene
Chloroform
Acetone

Throughout the remainder of the report these chemicals will be referred to as the Target Chemicals and the terms DDT and total DDT refer to all DDT

isomers as well as DDT metabolites DDD and DDE. Additionally, the terms BHC and total BHC refer to all BHC isomers throughout the plan.

LABORATORY ANALYSES

A review of the raw materials used in the DDT manufacturing process (Table 1) indicates two compounds of possible concern: chloral and monochlorobenzene. Both can be detected in a volatile organic analysis. To date no chloral has been detected in soil or water samples collected at the site. The lignins, silicon dioxide, calcium silicate, gypsum, and talc were commonly used materials but are of minimal concern. If desired, Oleum 65% and sodium hydroxide could be monitored by measuring pH in water and soil samples and analyzing for sulfate and sodium in water samples. These two chemicals however, are also of minimal concern. Igepon T-77 is a common industrial detergent that is biodegradable and therefore has not been considered for analysis.

Surface water, soil, and sediment samples from surface water runoff channels will be analyzed for the Target Chemicals. Soil samples taken where airborne transportation is the mechanism of potential distribution, such as the neighborhood samples, will be analyzed only for total DDT and total BHC because the volatile organic Target Chemicals would not be deposited by aerial dispersion. Laboratory analyses methodologies will be restricted to the Target Chemicals.

Laboratory methods, detection limits, handling, and preservation requirements for water samples are summarized in Table 2. All soil samples from borings will be analyzed for the Target Chemicals and results quantified. Soil sample handling, preservation, detection limits and analytical methods are summarized in Table 3. Potential aerial transport of chemicals to the neighborhood surrounding the site would preclude distribution and therefore subsequent detection of volatile organic chemicals. Consequently, shallow soil samples from the surrounding neighborhoods will be analyzed only for DDT and BHC. Sediment samples from the Kenwood Drain, Torrance Lateral, Dominguez Channel and Consolidated Slip will be analyzed for the Target Chemicals. Depending upon the matrix, all

Target Chemical concentrations will be measured by at least two of the following EPA methods for organic chemical analysis; methods 608 and 624 or 8080 and 8240. Sample handling, preservation, and analytical methods for the neighborhood samples and sediment samples are as summarized in Table 4. Since the analytical methods for the neighborhood and sediment samples are the same as the soil samples, the theoretical detection limits are the same. Analyses will be performed by Brown & Caldwell Analytical Laboratories, Pasadena, California. Analytical results will be quantified.

TABLE 1

RAW MATERIALS USED IN DDT
MANUFACTURING PROCESS [1]

Ammonium & Sodium Lignin Sulfonates (Orzan)
Amorphous Silicon Dioxide Hydrated (hi-Sil 233)
Calcium Silicate Synthetic (Micro-Cel E)
Calcium Sulfate Dihydrate (Industrial Ground Gypsum)
Chloral (trichloroethanol)
Magnesium Silicate Hydrate (Talc)
Monochlorobenzene (MCB)
Oleum - 65% (Fuming Sulfuric Acid)
Sodium-N-Methyl-N-Oleoyl Taurate (Igepon T-77)
Sulfonated Lignin (Reax 45A)
Sodium Hydroxide - 50% Solution

[1] Submitted to California Department of Health Services by MONTROSE CHEMICAL CORPORATION in May 1981.

TABLE 2

WATER SAMPLE HANDLING, PRESERVATION, AND ANALYSIS

Type of Analysis	Analytical Methods	Theoretical Detection Limits (ug/l)	Sample Container	Preservation
Monochlorobenzene	EPA Method 624	6.0	Two 40-ml glass vials with teflon-lined caps	Refrigerate to 4 degrees C
Dichlorobenzene		5.0		
Benzene		4.4		
Chloroform		1.6		
Acetone		10.0		
Total DDT (all isomers and metabolites)	EPA Method 608	0.01	1-liter amber glass with teflon-lined caps	Refrigerate to 4 degrees C
Total BHC (all isomers)		0.004		

TABLE 2

WATER SAMPLE HANDLING, PRESERVATION, AND ANALYSIS

Type of Analysis	Analytical Methods	Theoretical Detection Limits (ug/l)	Sample Container	Preservation
Monochlorobenzene	EPA Method 624	6.0	Two 40-ml glass vials with teflon-lined caps	Refrigerate to 4 degrees C
Dichlorobenzene		5.0		
Benzene		4.4		
Chloroform		1.6		
Acetone		10.0		
Total DDT (all isomers and metabolites)	EPA Method 608	0.01	1-liter amber glass with teflon-lined caps	Refrigerate to 4 degrees C
Total BHC (all isomers)		0.004		

TABLE 3

SOIL SAMPLE HANDLING, PRESERVATION, AND ANALYSIS

Type of Analysis	Analytical Methods	Theoretical Detection Limits (mg/kg)	Sample Container	Preservation
Monochlorobenzene	EPA Method 8240	0.3	Sealed brass tube sleeve with teflon-lined end caps	Refrigerate to 4 degrees C
Dichlorobenzene		1.5		
Benzene		0.3		
Chloroform		0.3		
Acetone		3.0		
Total DDT (all isomers and metabolites)	EPA Method 8080	0.03	Sealed brass tube sleeve with teflon-lined end caps	Refrigerate to 4 degrees C
Total BHC (all isomers)		0.01		

TABLE 4

NEIGHBORHOOD SOIL AND SEDIMENT SAMPLE

HANDLING, PRESERVATION, AND ANALYSIS

Sample Type: NEIGHBORHOOD SURFACE SOIL

Type of Analysis	Sample Container	Preservation	Analytical Method
Total DDT (all isomers) Total BHC (all isomers)	16 ounce by volume glass jar	Refrigerate 4 degrees C	EPA Method 8080

Sample Type: SEDIMENT SAMPLES

Type of Analysis	Sample Container	Preservation	Analytical Method
Total DDT	16 ounce by volume glass jar	Refrigerate 4 degrees C	EPA Method 8080
Monochlorobenzene dichlorobenzene benzene chloroform acetone	Two 40 ml VOA vials with teflon-lined threaded caps	Refrigerate 4 degrees C	EPA Method 8240

SAMPLING AND FIELD ACTIVITIES

The RIW off-site sampling activity is designed to provide additional data regarding the potential transport of certain chemical residues from the Montrose site. Nine areas have been identified for sampling activities. These areas include:

1. The perimeter of the site;
2. The utility easement area south of the site;
3. The drainage ditch that runs south parallel to Normandie Avenue from the site to the catchment basin at Farmer Brothers;
4. An historical drainage area from the main gate at Jones Chemical through the DWP substation, and under both Farmer Brothers' main buildings to the catchment area;
5. The Kenwood Drain, a storm sewer line which receives runoff from the site;
6. The Torrance Lateral;
7. The Dominguez Channel;
8. Consolidated Slip;
9. Neighborhood areas in the vicinity of the site;

SAMPLING LOCATIONS AND METHODOLOGY

The off-site field activities will include soil sampling, sediment sampling, and surface water sampling. Soil and sediment samples will be lithologically described. Surface water samples will be taken initially during dry weather, concurrent with sediment sampling. The surface water sampling round is to be repeated during various storm events. Presented below is a general summary of the methodology of sample collection procedures and field measurements to be performed during the off-site sampling program.

The precise locations of soil, water, and sediment sampling points may have to be adjusted in the field to accommodate drilling rig or sampling equipment access. Alternate locations for sediment sampling may be chosen if no sediment is present at the pre-selected location. Sampling locations may also be subject to change pending approval to enter off-site properties.

The Kenwood Drain will be inspected at each manhole cover and the depth and extent of any sediment in the immediate vicinity of the manhole will be measured by ruler and tape measure. If sufficient sediment exists in the immediate vicinity of the manhole, samples will be taken from inside the drain. Laboratory analyses requires a minimum of four ounces of sample by weight, and ideally 16 ounces. For health and safety reasons, personnel will not leave the immediate vicinity of the manhole to collect sediment.

Sediment samples will also be collected from the open channels of the Torrance Lateral and the Dominguez Channel as well as from the bottom of Consolidated Slip. Depth of sediment measurements will be made, where possible, at the sampling locations in the Torrance Lateral and Dominguez Channel. A ruler and/or tape measure will be used in the Torrance Lateral. Either a telescoping rod or depth soundings from known elevations on the bridges, compared to standard cross-sections obtained from LACFCD, will be used to estimate sediment depth in Dominguez Channel.

Soil Samples

Soil samples will be collected from 15 locations around the perimeter of the Montrose site, 12 locations in the power company easement area south of the site, on the north side of the Farmer Brothers' facility along transects 1 and 2 crossing the historical drainage area and along transects 3 through 6 located across the Normandie Avenue drainage ditch (Figure 2 and Table 5). Borehole locations along transects numbers 3 through 6, located across the Normandie Avenue drainage ditch, are indicated on (Figure 3). Transect numbers 1 and 2 will have eight borings and four borings respectively, each boring located approximately every seven feet along the transect. Transects 1 and 2 may be relocated in the field based on observations and results obtained from exploratory trenches numbers one through four. Additionally, the spacing of borings along transects one and two may be similarly adjusted. The objective of the construction of the exploratory trenches is to attempt to locate the historic drainage. Soil samples will be collected from the site perimeter, the historic drainage area, the power company easement, and the transects across the Normandie Avenue drainage ditch by auger boring and driving a split spoon sampler. The modified California drive sampler contains three 6-inch by 2-inch brass liners and will be utilized to a depth of 5.25 feet. Assuming adequate sample recovery, Montrose will have the middle brass tube analyzed for all Target Chemicals. An eight inch o.d. hollow stem flight auger will be used to bore the holes. Auger cuttings will be replaced in the hole and a mixture of bentonite and sand will be used to restore the grade if necessary.

In the historical drainage area samples will be collected using the split spoon drive sampler to a depth of 5.25 feet. These boreholes will also be constructed with an eight inch o.d. hollow stem auger. Exploratory trenches and boreholes will be backfilled after completion.

At their discretion, the lower brass tube will always be provided to the EPA as a split sample. Since true splits are not possible to obtain

without compromising sample integrity, split samples will be prepared in the field by marking and capping the top and bottom ends of the middle and lower brass tubes lining the split-spoon drive sampler. Both tubes will be sent to the appropriate labs unextruded; however, only the soil in the bottom half of the middle tube and the top half of the EPA split (lower tube) will be analyzed. Following the same format Montrose will collect one duplicate sample or 10%/day/matrix, whichever is greater. In addition one background sample per week, collected and packed in a 6-inch brass tube, will be analyzed for all Target Chemicals each week split spoon samples are collected.

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TABLE 5

PROPOSED OFF-SITE SOIL AND SEDIMENT SAMPLING

Location	Number of Sampling Locations	Sample Type/ Method	Depth of Boring (ft)	Sampling Interval (ft)	No. of Samples per Location	Total No. of Samples	Type of Analyses
Perimeter of Site	15	Soil/ Split Spoon	5	1	5	75	Target Chemicals
Historical Drainage Area	2 transects, holes located every 7 feet, 12 holes total	Soil/ Split Spoon	0-5 (Below Original Grade)	1	5	40	Target Chemicals
Power Co. Easement	12	Soil/ Split Spoon	5	1	5	60	Target Chemicals
Normandie Avenue Drainage Ditch	4 transects, 16 holes	Soil/ Split Spoon	5	1	5	80	Target Chemicals
Kenwood Drain	As available, up to 5	Sediment/ Trowel	0-0.25±	Surface Only	1	up to 5	Target Chemicals
Neighborhood	17	Soil/ Shovel	0-0.5	Surface Only	1	17	Total DDT
Torrance Lateral	5	Sediment/ Shovel	0-0.25±	Surface Only	1	5	Target Chemicals
Dominguez Channel	5	Benthic Sampler	0-0.25±	Surface Only	1	5	Target Chemicals
Consolidated Slip	10	Benthic Sampler	0-0.25±	Surface Only	5	10 Composite	Target Chemicals

Note: Theoretical detection limits for Target Chemicals may be found in Table 3, page 10.

Neighborhood Shallow Soil Samples

Seventeen surface soil sampling locations to delineate areas of possible aerial dispersion in nearby neighborhoods have been selected based on the long term wind direction (Figure 4). National Weather Service long term wind monitoring data from Los Angeles International Airport and other surrounding locations (Appendix C) indicate that the prevailing wind direction in the area is from the west to slightly south of west.

A total of 17 samples will be collected along two radii on an arc extending from approximately north to approximately southwest. The radii will be approximately one-half mile and approximately three-quarters of a mile from the east boundary of the site. As suggested by the Remedial Investigation/Feasibility Study Final Workplan, Metcalf and Eddy, October, 1984, these radii have been selected to allow sampling in nearby neighborhoods in areas where examination of topographic maps and aerial photos indicates bare soil is likely to be present. The rationale for these locations is that these are the radii where bare soil suitable for sampling is most likely to be found. Eight samples will be obtained on the one-half mile radius and nine samples will be obtained on the three-quarter mile radius (Figure 4). Sample locations are located east of the site downwind and are considered the most likely areas to find aerially dispersed DDT. Sample locations southwest of the site are located in residential areas in proximity to the site. Sample locations on the three-quarter mile radius have been shifted to avoid sampling directly downwind from sampling locations along the half-mile radius. Final sample locations will be determined in the field based on the following set of criteria:

1) Sample from bare, older soil that appears to have not been recently disturbed.

2) Sample from the lee or east side of structures where aeolian deposition would occur most frequently.

3) Sample in areas where agricultural/garden activities are not occurring.

4) Sample in areas of public access.

5) Samples will not be taken from low lying areas which may have been subject to fluvial deposition.

If, after evaluation of the data, EPA determines that additional sampling is necessary, then a second round of neighborhood sampling will be designed based on the results and distributions of the first phase data. In its evaluation of first phase data, EPA will consider, among other things, total DDT concentrations in excess of the Total Threshold Limit Concentration (California Assessment Manual) of one mg/kg.

Sediment Samples

Approximately five sediment samples will be collected along each of the following drainages; the Kenwood Drain, the Torrance Lateral, and the Dominguez Channel (Figure 4 and Table 6). Sediment samples will be collected from each manhole along the Kenwood Drain where sediment is present. Sediment deposits were observed at the Torrance Lateral sampling stations during a recent field trip. Along the Dominguez Channel, two samples will be collected upstream and three downstream from the Montrose site. The locations are readily accessible and should be as representative of potential sediment deposition as any other location. Also, for safety reasons, sampling stations have been located at the bridge crossings. If sediment is not collected at a prescribed location in Dominquez channel, sampling will be attempted at the next closest bridge crossing. Sieve analyses will be conducted on any poorly sorted sediment samples. Separate chemical analyses will be run for each size fraction retaining more than 25 percent of the sample.

Ten sediment sample locations have been selected at Consolidated Slip, located at the mouth of Dominguez Channel (Figure 4 and Table 6). The transect locations have been selected to provide sediment sample coverage for a representative, offset series of cross sections for the entire length of the slip. Samples will be collected from ten 20-foot transects. Each transect is considered a sampling location. Sediment samples submitted for analysis from each location at Consolidated Slip will be a composite of five individual samples. The individual samples will be collected at the ends and at five foot intervals along the transect.

TABLE 6

PROPOSED SEDIMENT SAMPLING LOCATIONS

Sampling Site No.	Location Description	
(SED-1)	Kenwood Drain:	Manholes
(SED-2)	Kenwood Drain:	Manholes
(SED-3)	Kenwood Drain:	Manholes
(SED-4)	Kenwood Drain:	Manholes
(SED-5)	Kenwood Drain:	15 feet upstream from the Torrance Lateral.
(SED-6)	Torrance Lateral:	Adjacent to Kenwood Drain
(SED-7)	Torrance Lateral:	At bend approximately 400 feet upstream from Torrance Avenue
(SED-8)	Torrance Lateral:	At Torrance Avenue.
(SED-9)	Torrance Lateral:	At first bend in channel east of Main Street.
(SED-10)	Torrance Lateral:	At third bend in channel east of Main Street.
(SED-11)	Dominguez Channel:	At Main Street.
(SED-12)	Dominguez Channel:	At the Dominguez Golf Course.
(SED-13)	Dominguez Channel:	Avalon Blvd. bridge below mouth of Torrance Lateral.
(SED-14)	Dominguez Channel:	Wilmington Ave. bridge.
(SED-15)	Dominguez Channel:	Sepulveda Ave. bridge.
(SED-16 through 20)	Consolidated Slip:	Five 20 foot transects on the north side of slip.
(SED-21 through 25)	Consolidated Slip:	Five 20 foot transects on the south side of the slip.

Sample Collection Procedures

Surface soil will be sampled using a hand auger or shovel and collected in one 16 ounce by volume glass mason jar and one 40 ml VOA vial. Glass containers have been chosen due to their relative inertness to the chemicals of concern. Deeper soil samples will be collected using split spoon drive samplers with six inch by two inch brass liners. Sediment samples, with the exception of those collected at Dominguez Channel and Consolidated Slip, will be collected using a shovel, trowel, or telescoping pole with attached beaker, depending on access and the depth of water, if any, overlying the sediment.

Sediment samples from Dominguez Channel and Consolidated Slip will be collected with a stainless steel benthic sampler. At Consolidated Slip, approximately three to four ounces of sample will be taken from the center of the approximately three pounds of sediment collected in the benthic sampler at each point on the transect. A small scoop will be used to transfer sediment from the approximate center of the sample (avoiding the uppermost portion of the sample) to the 16 ounce glass jar. By repeating the process five times along the transect, a representative composite sample will be collected.

Samples collected using split spoon brass sleeves will be immediately sealed in the tubes with teflon liners and plastic end caps. End caps will be secured with electrical tape. OVA or HNu analyses will be conducted on the adjacent ends of the adjoining brass tubes unless a split is requested, in which case only one adjacent end may be analyzed by the OVA or HNu.

Each sample container will be labeled immediately and stored on ice. Samples will be shipped or delivered to the laboratory within 24 hours. All sampling devices which are to be reused will be cleaned prior to each sampling event with a non-phosphate detergent wash, a tap water rinse, and a certified organic free water rinse. Specific soil sampling procedures,

including cleaning and rinsing procedures, are discussed in the QAPP, pages 11 - 13.

Field Measurements and Equipment Requirements

Field measurements for the off-site soil and sediment sampling activities will include descriptions of soils, general indications of prevailing climatic and site-specific weather conditions, and any other information concerning observations of field conditions which might influence the sample collected. Sampling procedures will also be noted and will include method, type of container used, depth and location of sample, and short-term storage procedures. HNu or OVA readings will be taken for each soil sample. All field measurements will be recorded in a field notebook.

Sample collecting devices will consist of hand augers, shovels, trowels split spoons, telescoping poles, a stainless steel benthic sampler, or the actual sample container, depending on the sampling activity. All sampling devices will be cleaned before and between use. Drill rig flight augers will be steam cleaned before and between each use. Appropriate labels and chain-of-custody forms will used. Examples of the labels and chain-of-custody forms to be used may be found in the QAPP, Appendix A (Hargis + Associates, Inc. 1985).

SURFACE WATER SAMPLING

Surface water samples will be collected in the drainage ditch beginning at Jones Chemical Company and continuing along Normandie Avenue, the Torrance Lateral, Dominguez Channel and Consolidated Slip during, or immediately after, defined precipitation events if runoff is present (Figures 2 and 4; Table 7). Collection of these samples will depend on adequate precipitation events to sustain surface water runoff in these

areas. Duplicate or split samples may be collected and retained by the EPA in the field.

A local observer will be contracted to maintain daily contact with the National Weather Service during the remainder of the rainy season and report via telephone to the Project Coordinator. Contact with the NWS may also be maintained by the Montrose Project Coordinator. Alert status may be declared by the Project Coordinator when the probability of rainfall reaches 75 percent or greater. Mobilization will be instituted when the local observer reports actual sustained rainfall which is likely to produce runoff. A pre-prepared module of dedicated sampling equipment will be ready at all times. Sequential runoff sampling will be prioritized by starting at the site and working downstream from there. Driving and sampling times will be noted during dry weather sampling and used to plan for wet weather sampling and possible contingencies. Alternative sampling locations at Consolidated Slip during wet weather sampling may be used for health and safety reasons or very short notice equipment procurement problems. The center of the Henry Ford Avenue bridge, the ends of the four docks at the northern marina and the ends of the five docks at the southern marina at Consolidated Slip (Figure 4) are alternative wet weather sampling sites if marine safety or equipment procurement problems prevent timely completion of the surface water sampling round. Final details for obtaining the splits or duplicates will be arranged by the respective project coordinators when EPA is notified of an upcoming sampling event. This will include a list of business and home phone numbers of key and alternate personnel.

Montrose is limited by the order to collecting and analyzing a total of sixty (60) surface water samples. Surface water samples will be collected at locations SW-1 through SW-5 for five consecutive eligible storms (Figures 2 and 4). Eligible storms must have a total rainfall exceeding 0.20 inch. Six consecutive hours with less than 0.01 inch of rainfall shall mark the end of a storm. Surface water samples at these locations will also be collected for one storm exceeding 0.75 inch, and may be one of the five consecutive storms. Surface water samples will be collected from locations

SW-6 through SW-10 from Dominguez Channel for two storms. Ten surface water samples will be collected from Consolidated Slip during a storm (wet weather) event. Eligible storms must have a total rainfall exceeding 0.20 inches. Stream discharge for Dominguez Channel will be determined from LACFCD's Dominguez Channel gaging station as discussed below. Details pertaining to the collection and handling of water samples are contained in the QAPP, pages 14 - 17, (Hargis + Associates, Inc, 1985).

Surface water samples will also be collected from the Dominguez Channel (SW-6 through SW-10) and Consolidated Slip during dry weather. These samples will be collected during the sediment sampling round at the sediment sampling location. The samples from Consolidated Slip will be composites from samples obtained at 0.3 and 0.6 of total water depth.

Sampling Locations

During or immediately after defined precipitation events, the following described locations will be sampled if runoff is present. A surface water runoff sample (SW-1) will be collected from the lined ditch leaving Jones Chemical Company upstream of the Montrose site discharge to the Normandie Avenue drainage ditch (Figure 2). Two surface water runoff samples will be collected from the Normandie Avenue drainage ditch at the culvert under the railroad tracks east of the lined ditch (SW-2) and at the entry point to the Farmer Brothers Coffee parking lot (SW-3) (Figure 2). Two surface water samples will be collected in the Torrance lateral, one each at the Vermont and Main Street crossings (Figure 4). Five additional water samples will be collected in the Dominguez Channel: two samples upstream and three downstream of the Torrance Lateral confluence (Figure 4). The proposed surface water sampling schedule is summarized in Table 7.

Dry weather surface water sampling locations for the Dominguez Channel and Consolidated Slip will be at the sediment sampling points shown on Figure 4.

Sample Collection Procedures

Surface water samples will be collected in appropriate glass containers by immersing the sample container in the water. The sample containers will be rinsed with sample water before the sample is collected. The water sample will be taken below the water surface with the mouth of the bottle facing upstream. Volatile organic samples will be taken in 40 ml (milliliter) vials, such that no air bubbles remain in the vial after it has been capped.

At Consolidated Slip water samples will be taken at 0.3 and 0.6 of the total depth at each sediment sampling location but will be combined in one container. A PVC point source bailer will be used to obtain samples at the specified depths. Consolidated Slip water samples will be integrated by directly transferring water from the bailer to the sample container until it is half filled. After collecting water from the second depth with the bailer, the water will again be transferred directly to the sample container until the container is completely filled.

All samples will be labeled, placed in clear plastic bags, and packed with plastic bubble material in Coleman-type ice chests cooled with blue ice and/or double plastic bagged ice, as appropriate. Paperwork will be placed in plastic bags and taped to the underside of the cooler lid. The cooler will be closed and sealed prior to shipment. Samples will be delivered within 24 hours to the laboratory for analysis. Containers used to refrigerate the samples will also protect the samples from light.

The flow rate at surface water sampling points in the Dominguez Channel will be obtained from the LACFCD Dominguez Channel gaging station located at the Carson Street crossing of the channel between sampling station SW-8 and SW-9 (Figure 4). Daily gage heights are recorded and weekly stream discharge measurements are taken by the LACFCD hydraulics division. Estimates of flow in the drainage ditch and Torrance Lateral will be made by float-area estimation or, in the case of high discharge in the Torrance

Lateral by obtaining standard cross section and slope information and using standard surface water equations to compute theoretical flows.

TABLE 7

PROPOSED SURFACE WATER SAMPLES

Sampling Site		Type of Sample Collected	Type of Analyses	Detection Limits
(SW-1)	Drainage ditch leaving Jones	Water	Target Chemicals	Detection limits for water samples may be found in Table 2, page 9.
(SW-2)	Culvert under railroad track	Water	Target Chemicals	
(SW-3)	Drainage ditch at entry point to Farmers Bros. parking lot	Water	Target Chemicals	
(SW-4)	Torrance Lateral at Vermont St.	Water	Target Chemicals	
(SW-5)	Torrance Lateral at Main St.	Water	Target Chemicals	
(SW-6)	Dominguez Channel at Main St.	Water	Target Chemicals	
(SW-7)	Dominguez Channel at the utility bridge upstream of Avalon St.	Water	Target Chemicals	
(SW-8)	Dominguez Channel Avalon Blvd. bridge	Water	Target Chemicals	
(SW-9)	Dominguez Channel Wilmington Ave. bridge	Water	Target Chemicals	
(SW-10)	Dominguez Channel Sepulveda Ave. bridge	Water	Target Chemicals	
(SW-11 through SW-20)	Consolidated Slip	Water	Target Chemicals	

Note: VOA samples cannot be filtered and maintain sample integrity.
All samples will be analyzed unfiltered, and 25% of the pesticide samples will be analyzed after they are filtered.

Field Measurements and Equipment Requirements

Field measurements recorded during the surface water sampling activities will include temperature, pH, and electrical conductivity of the sample. General observations of climatic and site weather conditions, and any other factors which might affect the collected sample will be recorded. A combination conductivity-temperature-salinity meter will be used to measure the electrical conductivity. Temperature measurements will be obtained with a field thermometer and the result verified with the conductivity meter. The instruments will be calibrated daily to ensure accuracy and the probes thoroughly rinsed with distilled water before each measurement. All field measurements will be recorded in a field notebook.

Sample containers for volatile organics consist of 40 ml glass vials equipped with teflon-lined septum. Sample containers for pesticides will consist of one-liter amber colored glass bottles with teflon-lined caps.

QUALITY ASSURANCE

The objective of a quality assurance program is to provide data for which the limits of uncertainty are known and from which sound conclusions may be drawn. Proper documentation will provide records of traceability and adherence to prescribed protocols.

The quality assurance program, described in the accompanying Quality Assurance Project Plan, established for this investigation will contain complete documentation records of all sampling activities, including: field measurements and the calibration of instruments; sampling techniques; preservation procedures; sample integrity documentation (blanks, splits, duplicates); chain-of-custody records; packaging, shipping, and handling procedures; analytical methods; and laboratory quality control procedures.

SAMPLING SCHEDULE

This off-site sampling plan consists of three sampling rounds (Figure 5). Round one consists of soil sampling from borings around the site perimeter and along borehole transects 1 through 6. Round two consists of sediment sampling, dry weather surface water sampling and neighborhood soil sampling. Round three consists of all surface water sampling during the defined precipitation events. Scheduling of sample rounds one and two is shown on Figure 5. Scheduling of round three is dependent on the timing of precipitation events of the appropriate magnitude.

OFF-SITE SAFETY PLAN

Surface soils immediately off-site in the perimeter area contain concentrations of DDT ranging from 0.7 ppm to 2,400 ppm (Hargis & Montgomery, Inc., 1983). Off-site surface soils have not been analyzed for VOC's but concentrations would be expected to be nonexistent to very low. Concentrations of DDT in soils sampled from neighborhoods in the vicinity of the former facility range from none detected to 5.1 ppm. Capping of the site has eliminated potential exposure to air-borne dust containing DDT from on-site while sampling immediately off-site. Stormwater runoff samples collected by Montrose in 1982 indicated concentrations of total DDT ranging from 0.009 to 3.26 ppm. Capping of the site has also eliminated stormwater runoff from transporting DDT contaminated soils off-site. The potential for exposure of personnel to soil, dust, and water containing DDT will be minimal with proper adherence to the Safety Plan summarized in Appendix A.

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Illustrations

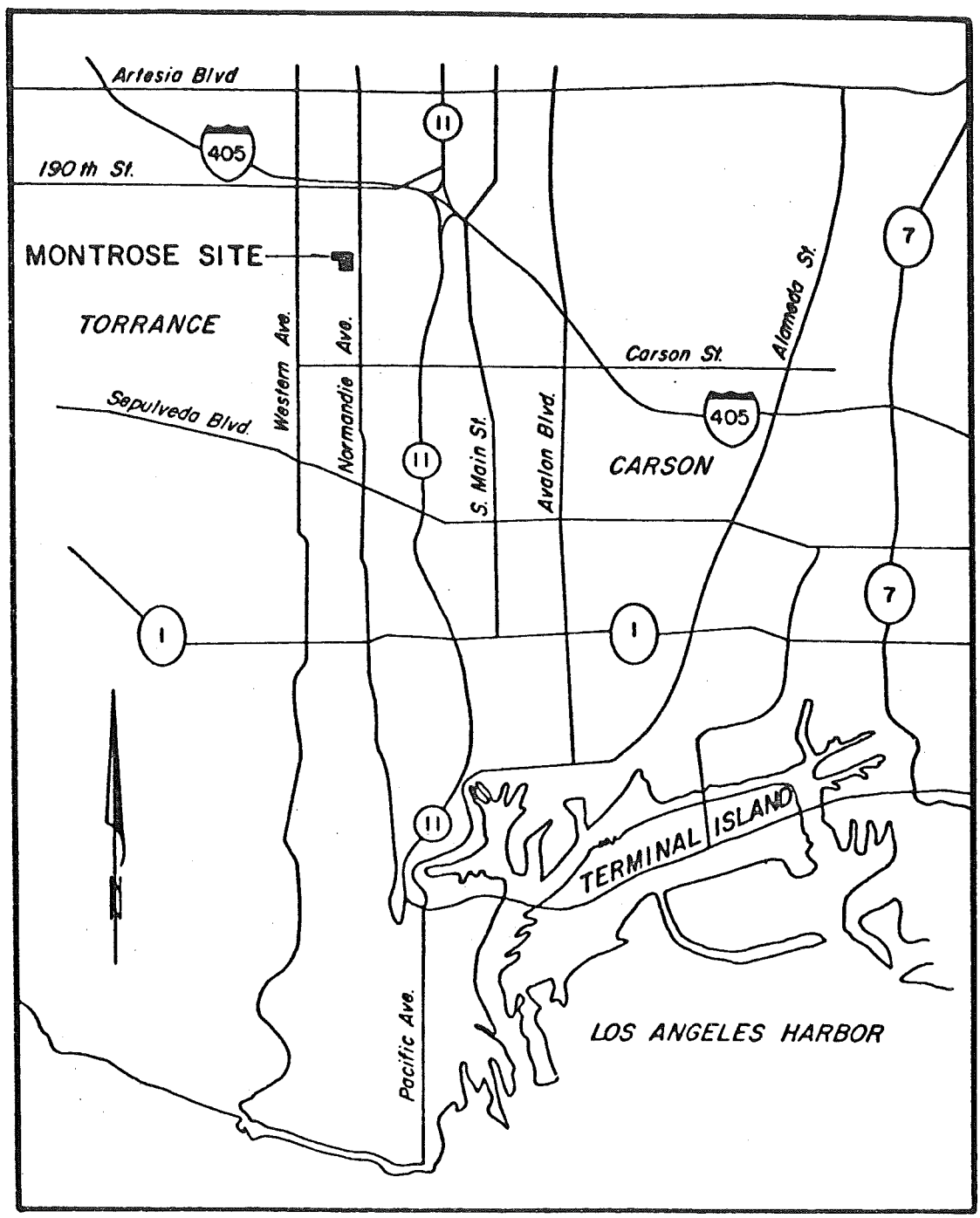
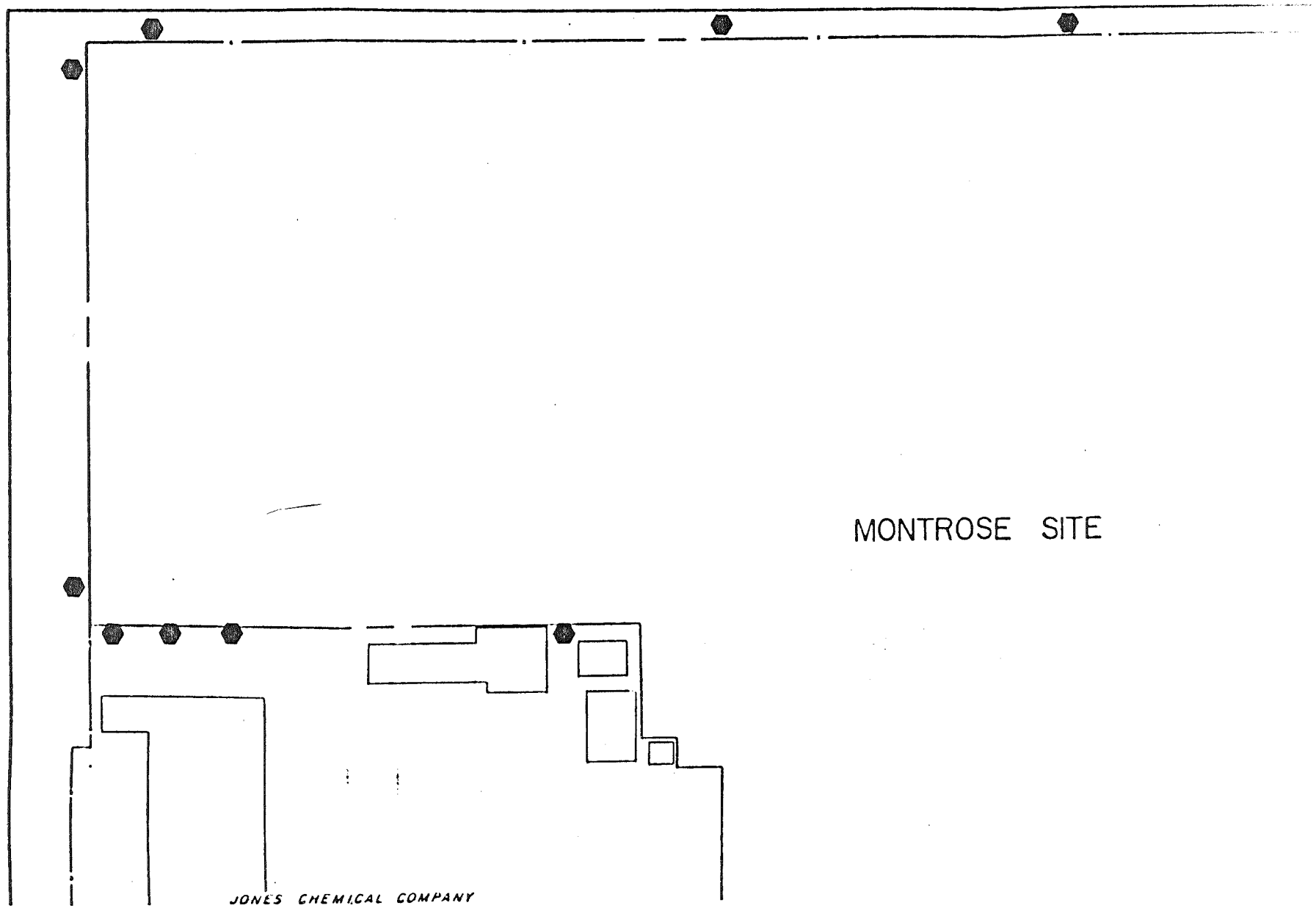
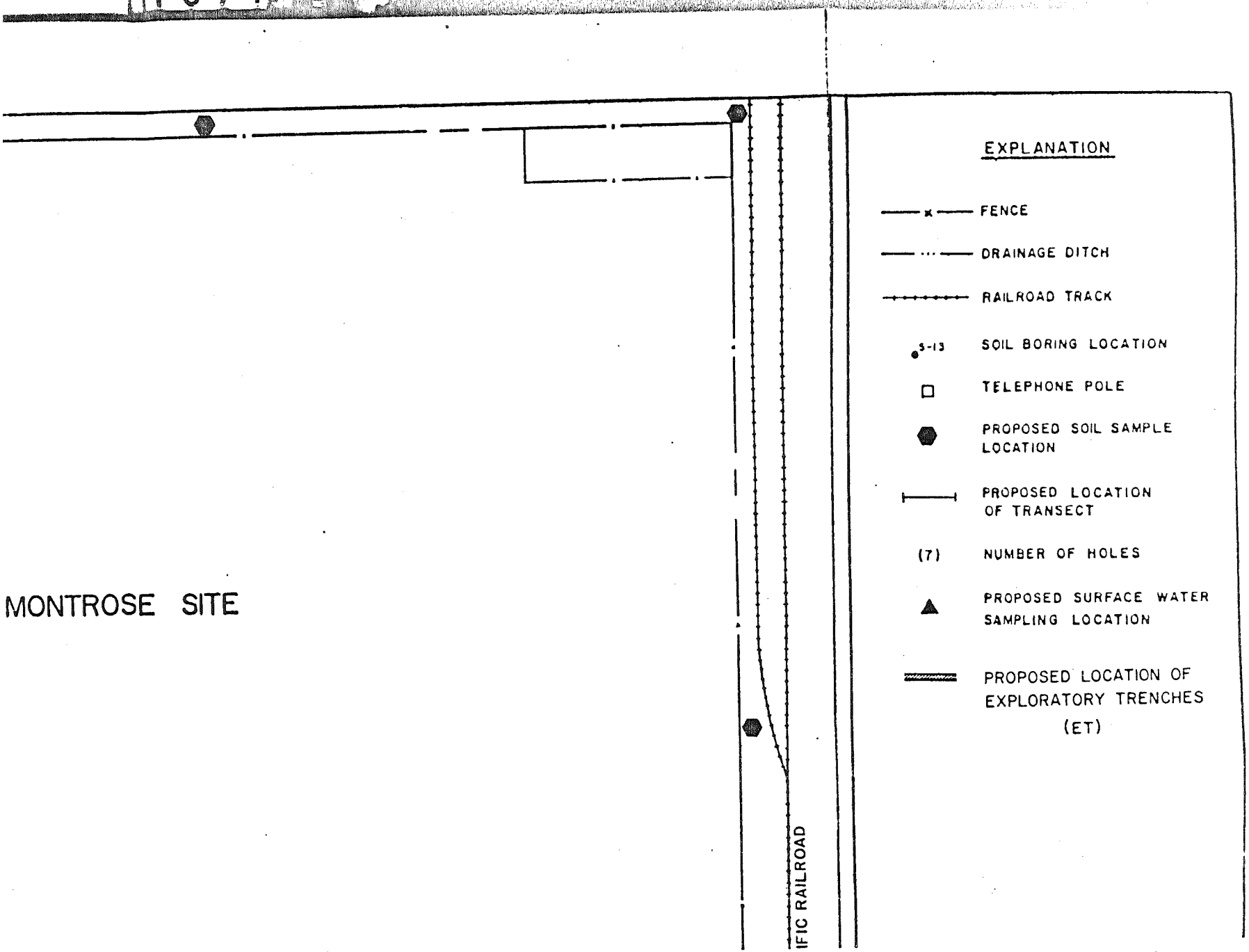
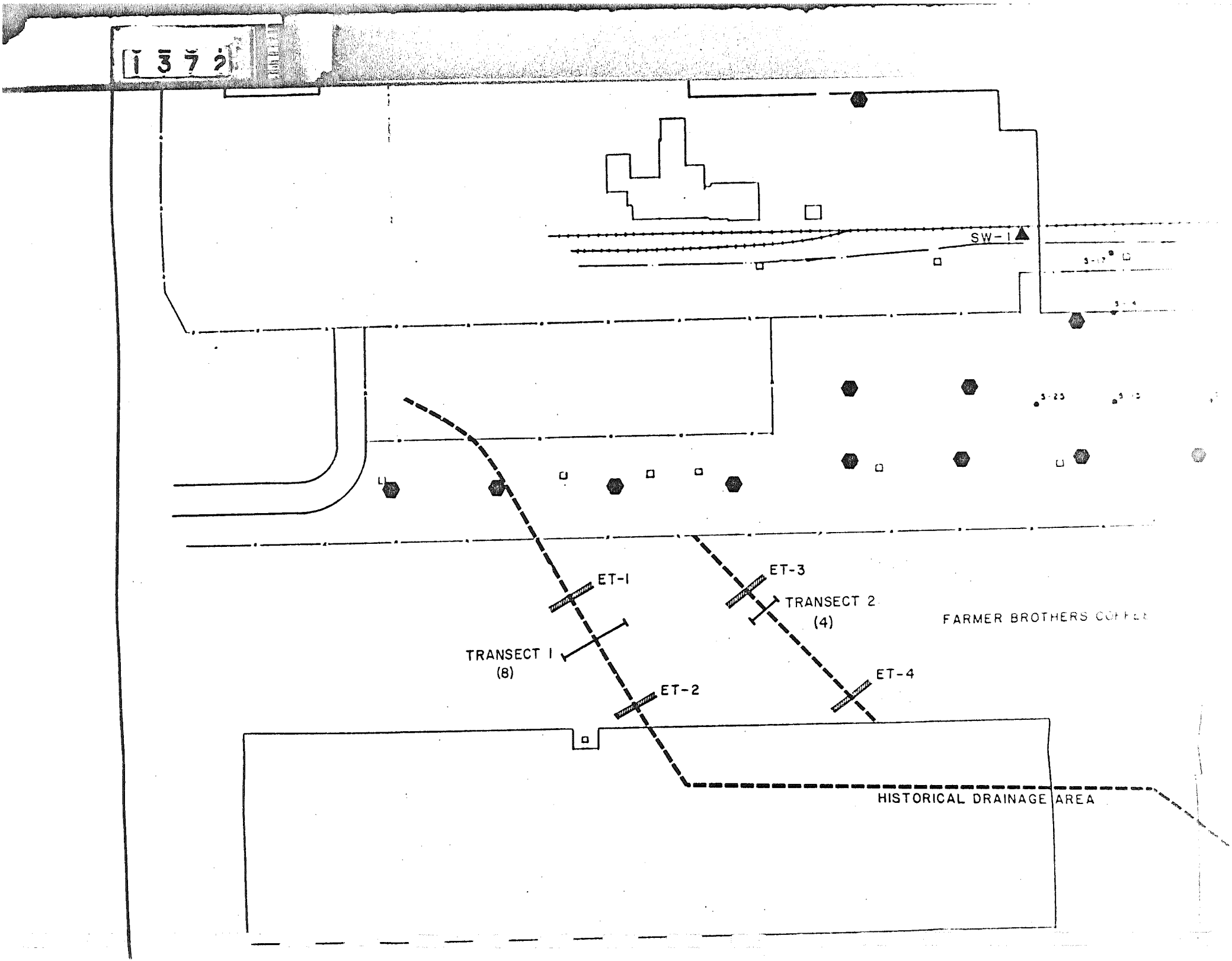


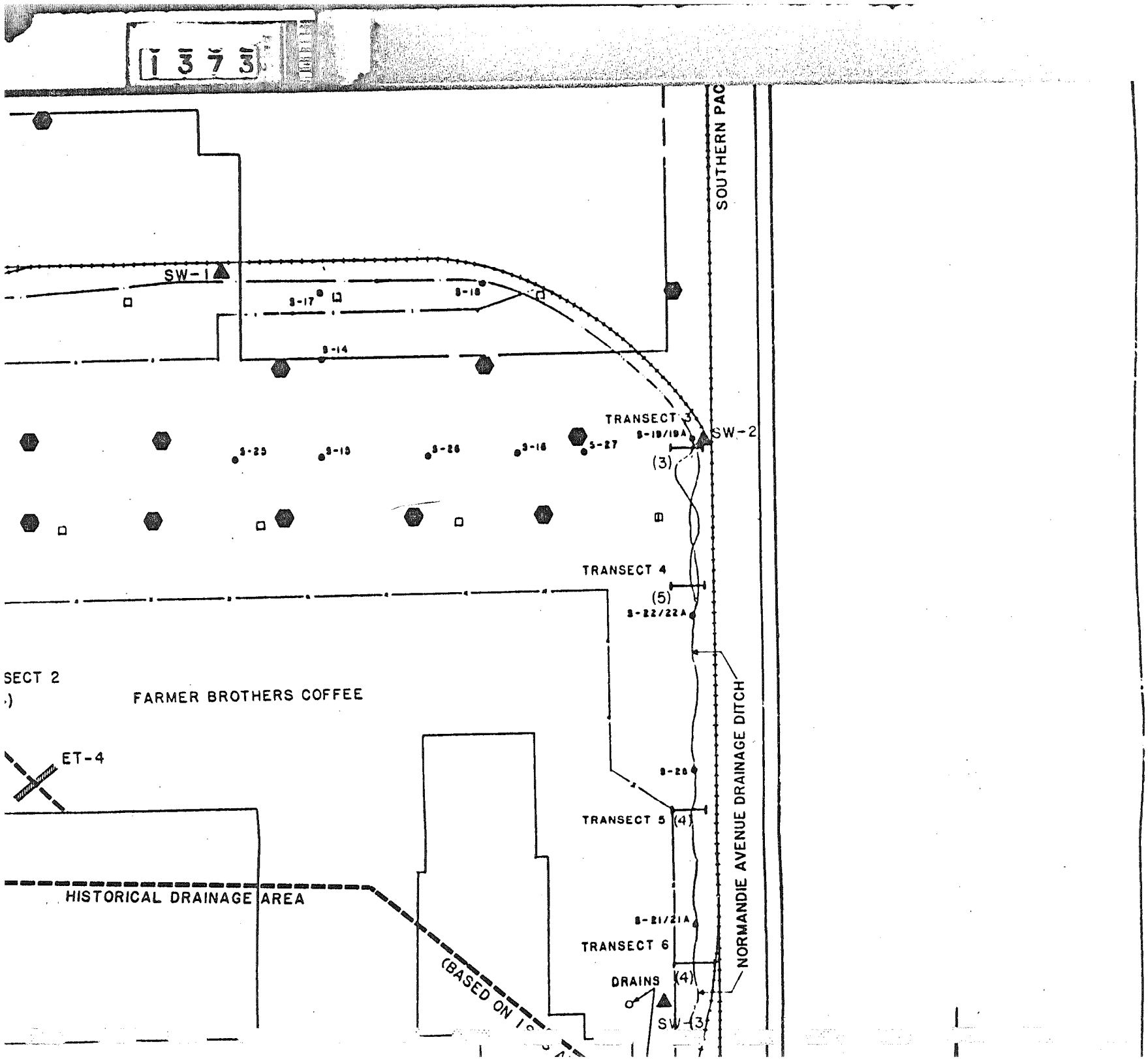
FIGURE 1. LOCATION OF MONTROSE SITE

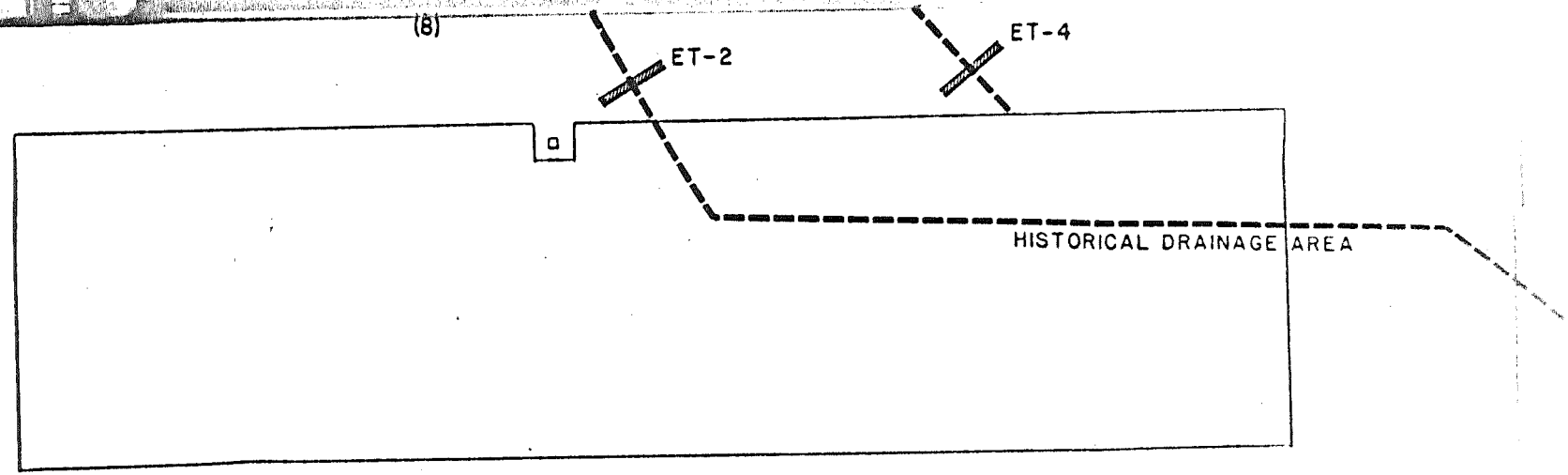


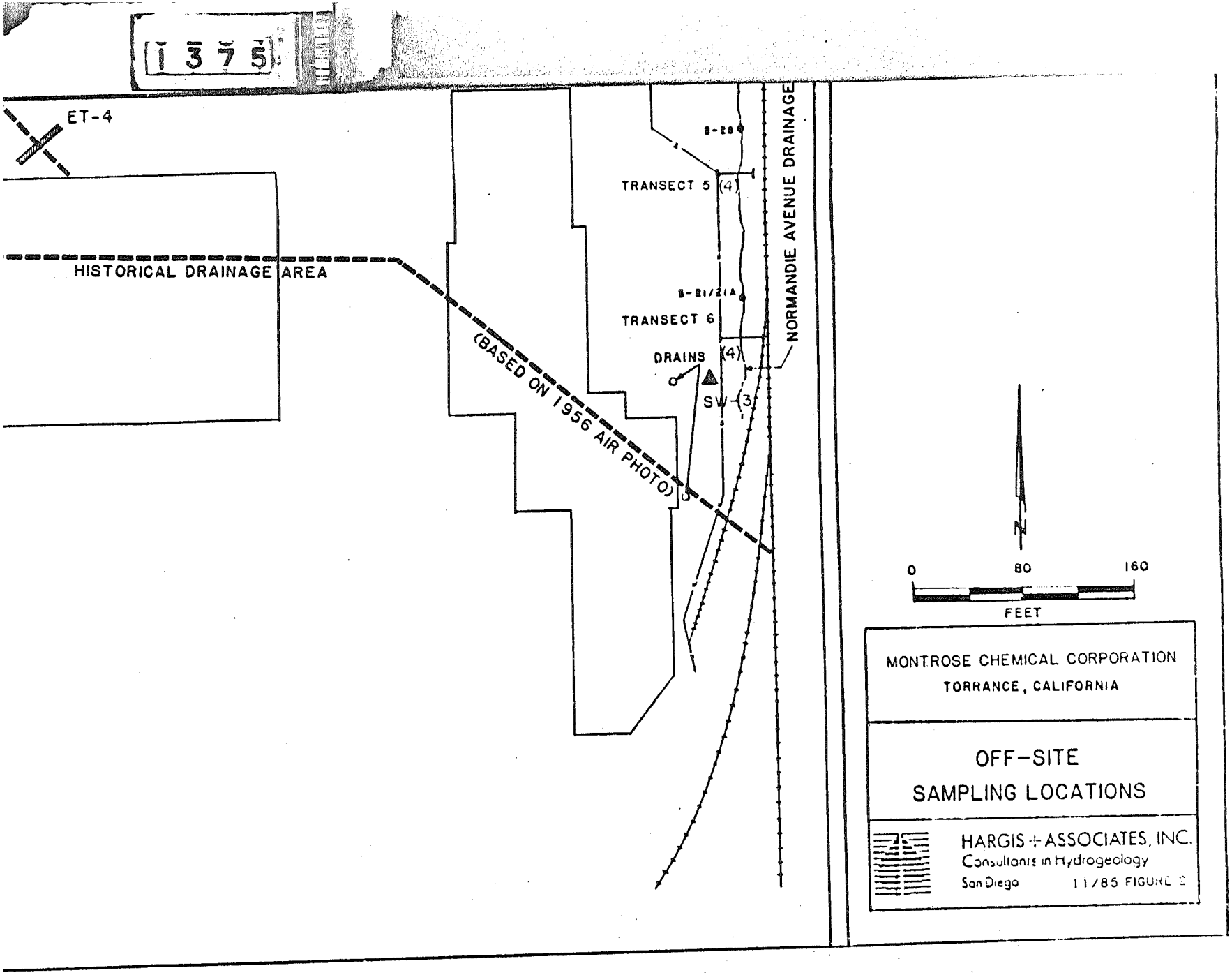


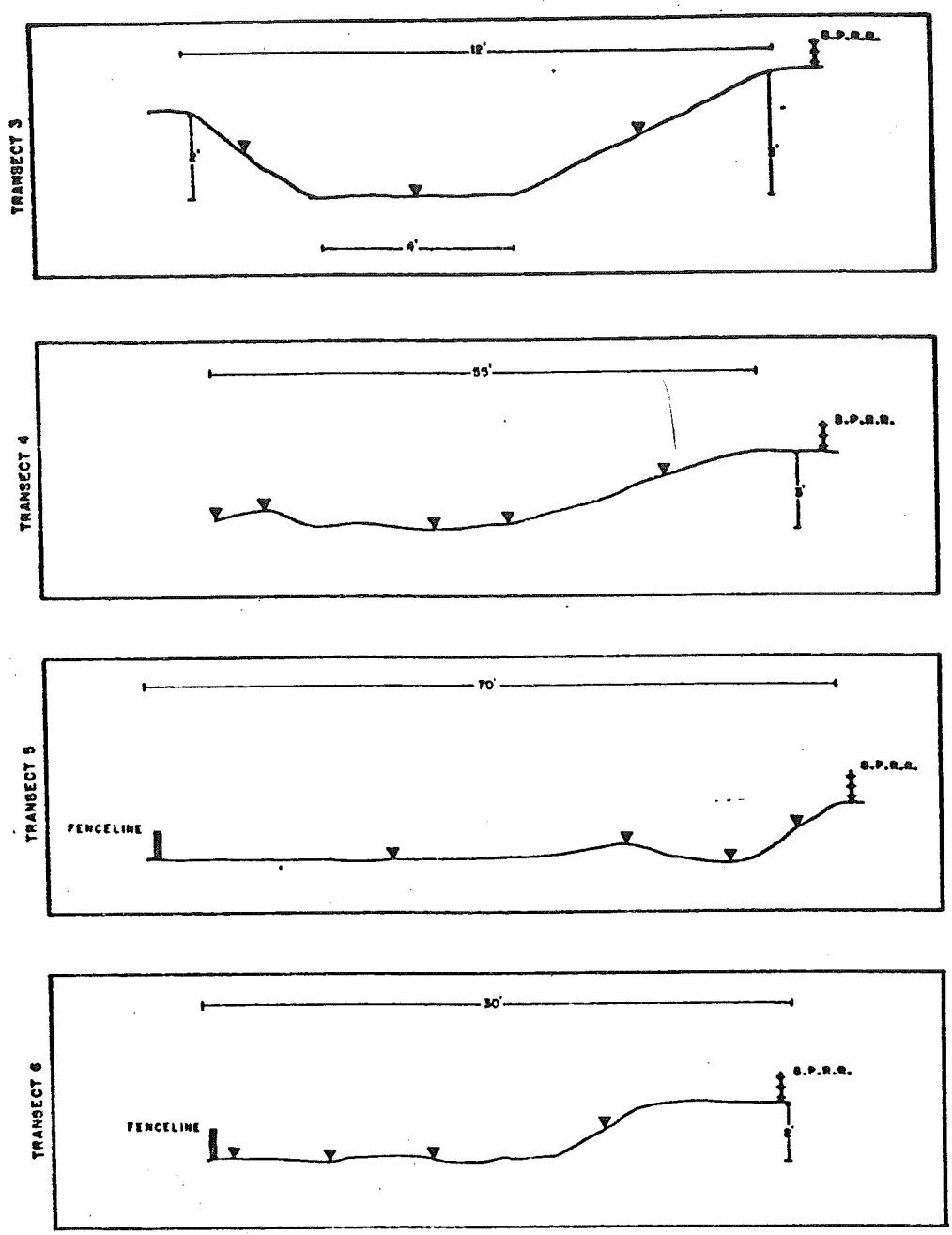
MONTROSE SITE







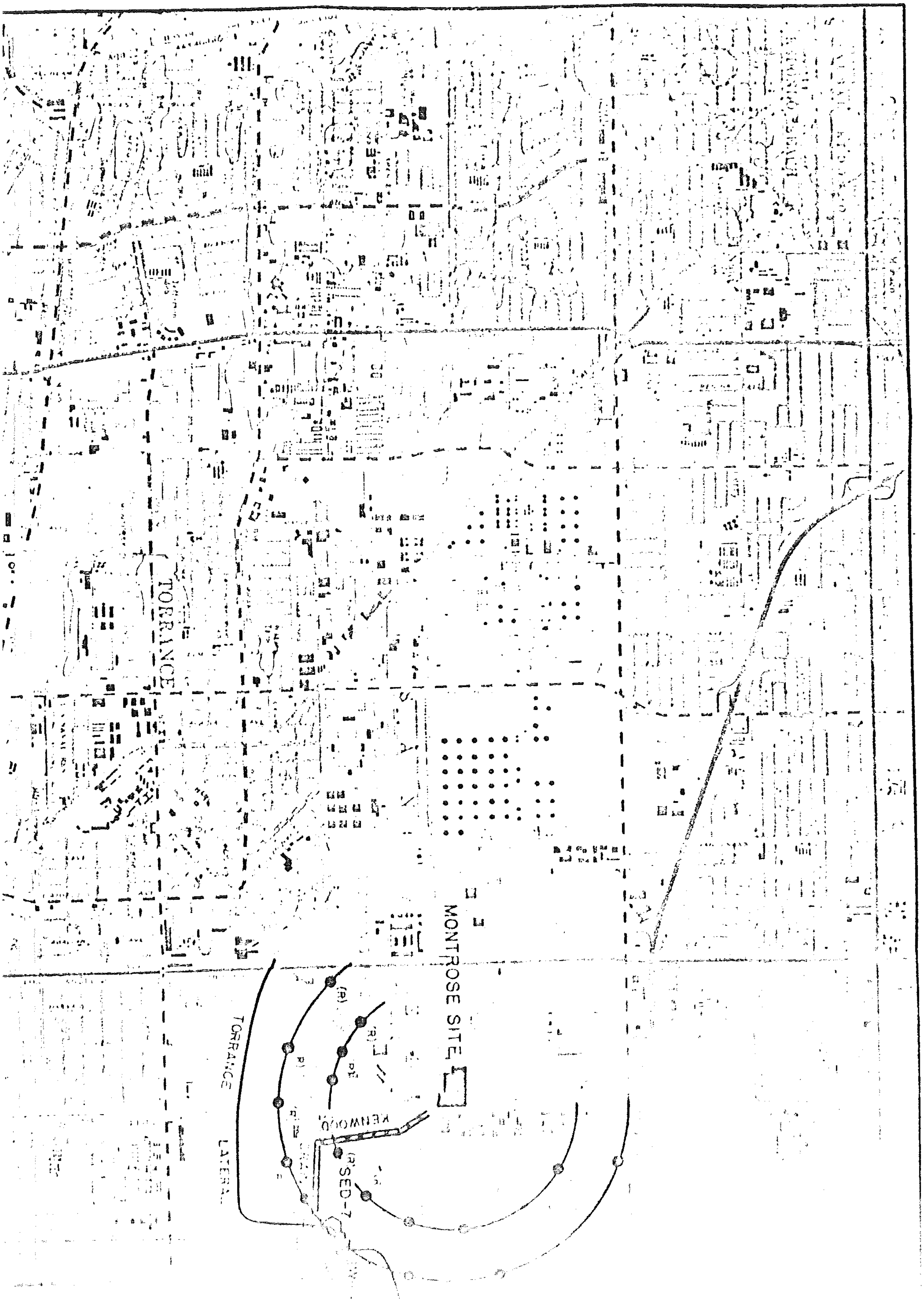




▽ = BOREHOLE LOCATION

ALL DIMENSIONS ARE APPROXIMATE. SEE FIGURE 2 FOR TRANSECT LOCATIONS.

FIGURE 3. SCHEMATIC DRAWINGS OF BOREHOLE TRANSECTS ACROSS THE NORMANDIE AVENUE DRAINAGE DITCH.



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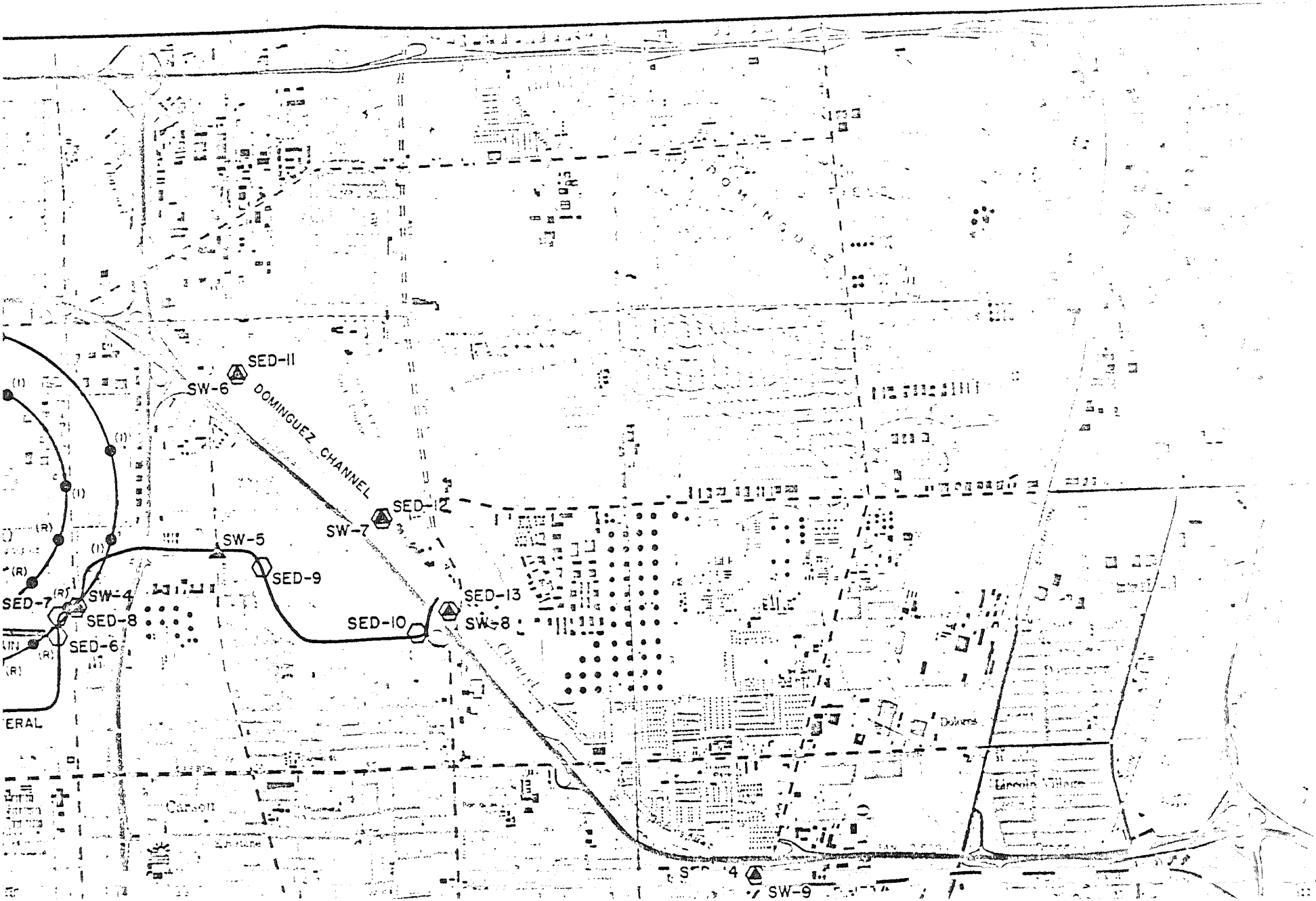
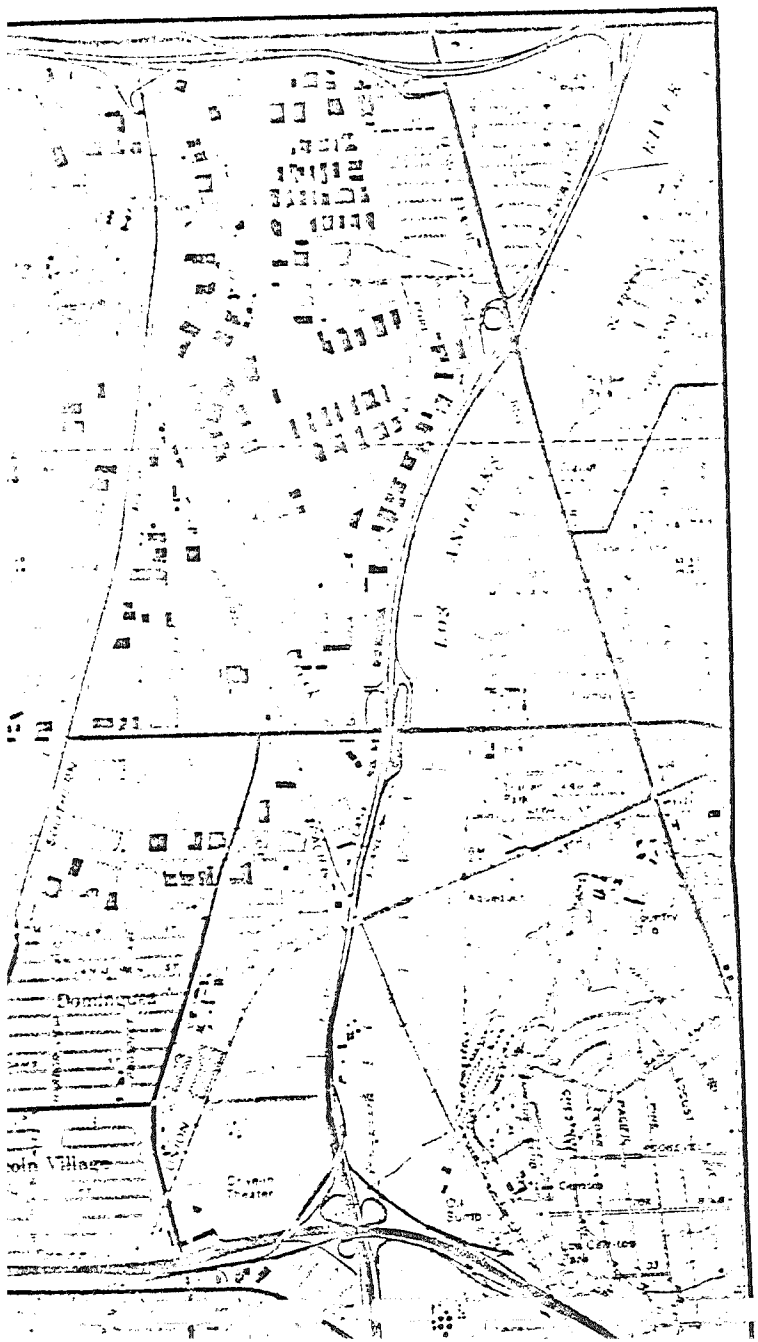




EXPLANATION

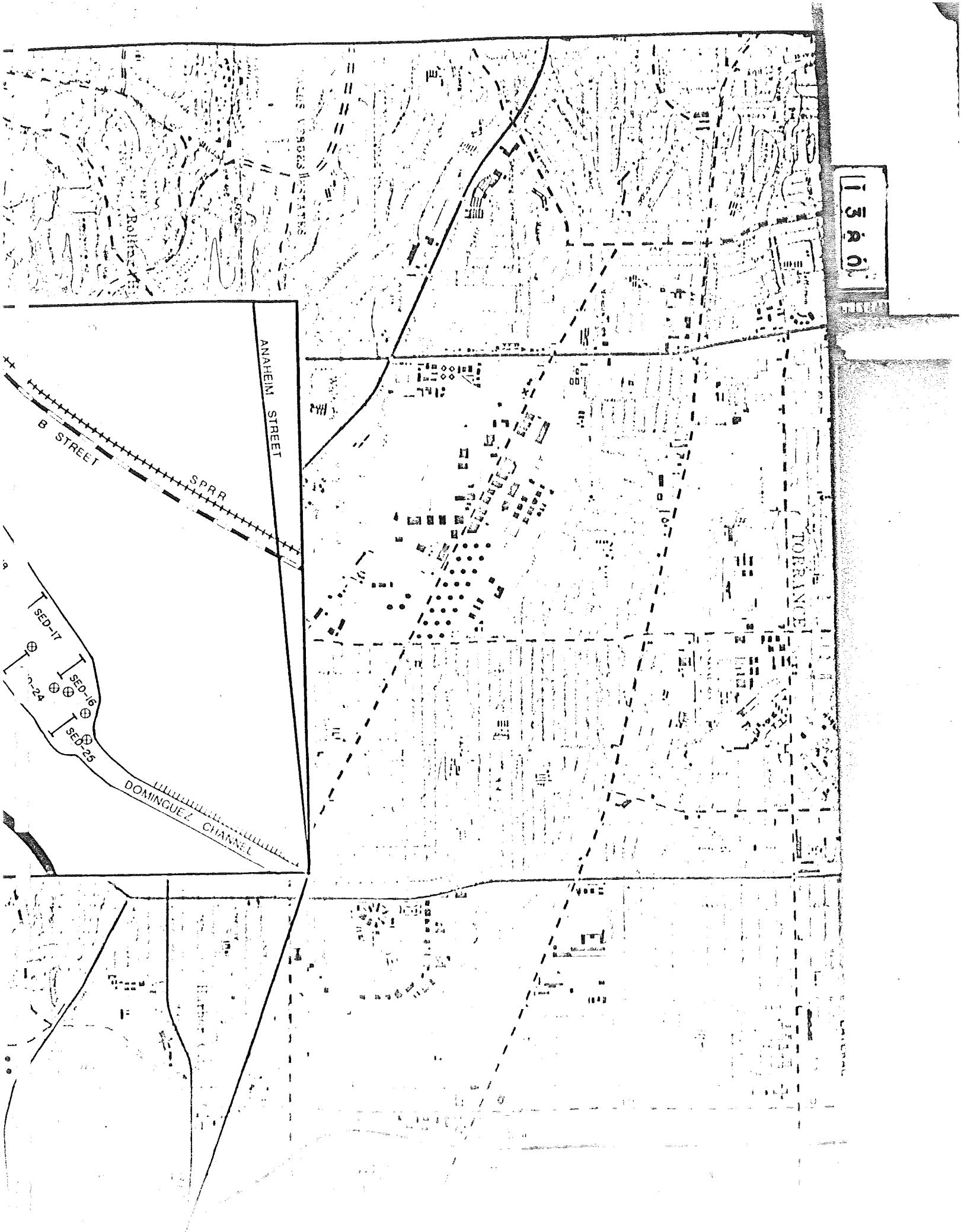
SED-7 — SEDIMENT SAMPLE LOCATION

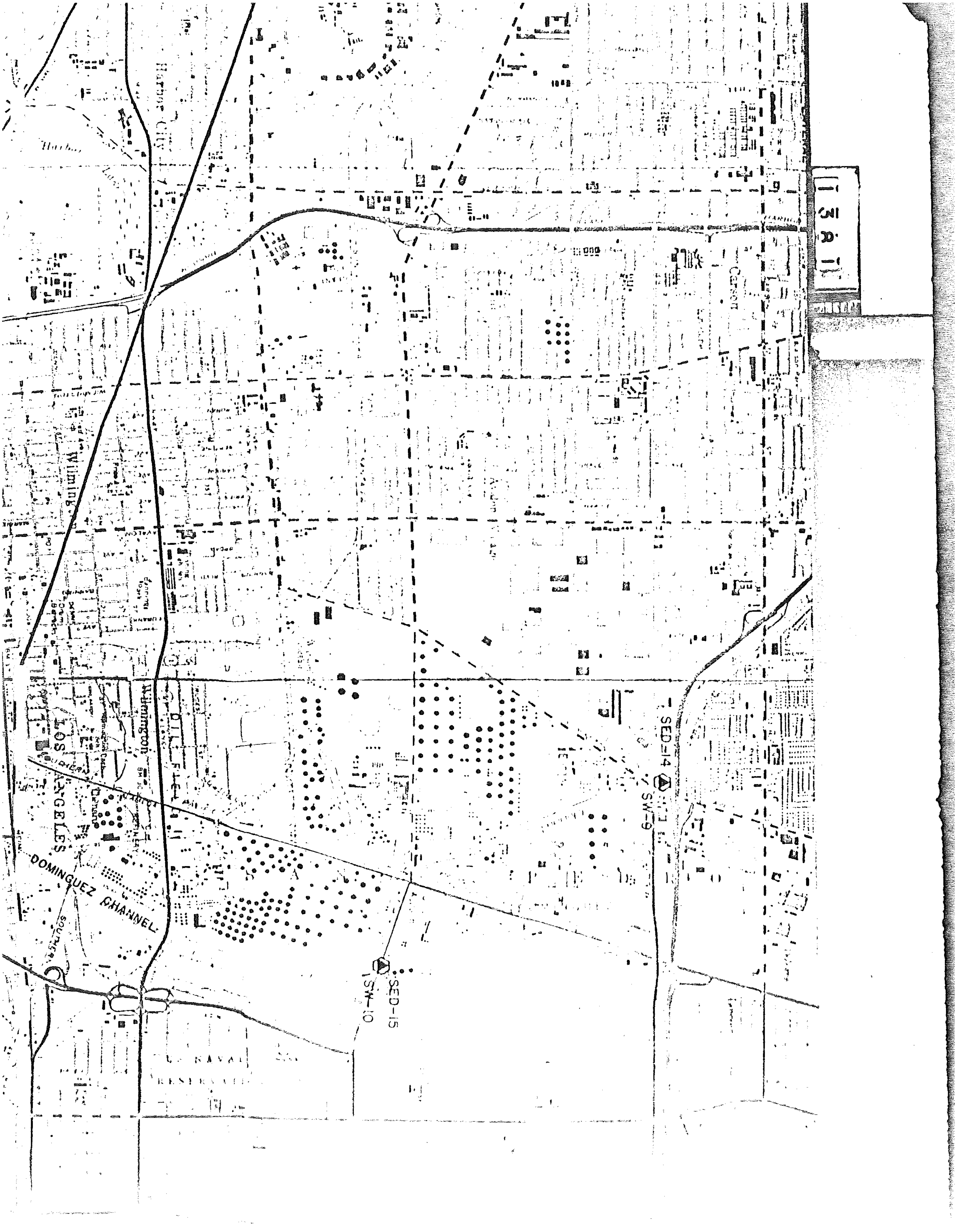
SW-10 — SURFACE WATER SAMPLE LOCATION

NEIGHBORHOOD SHALLOW SOIL SAMPLE

I INDUSTRIAL SAMPLE LOCATION

R RESIDENTIAL SAMPLE LOCATION





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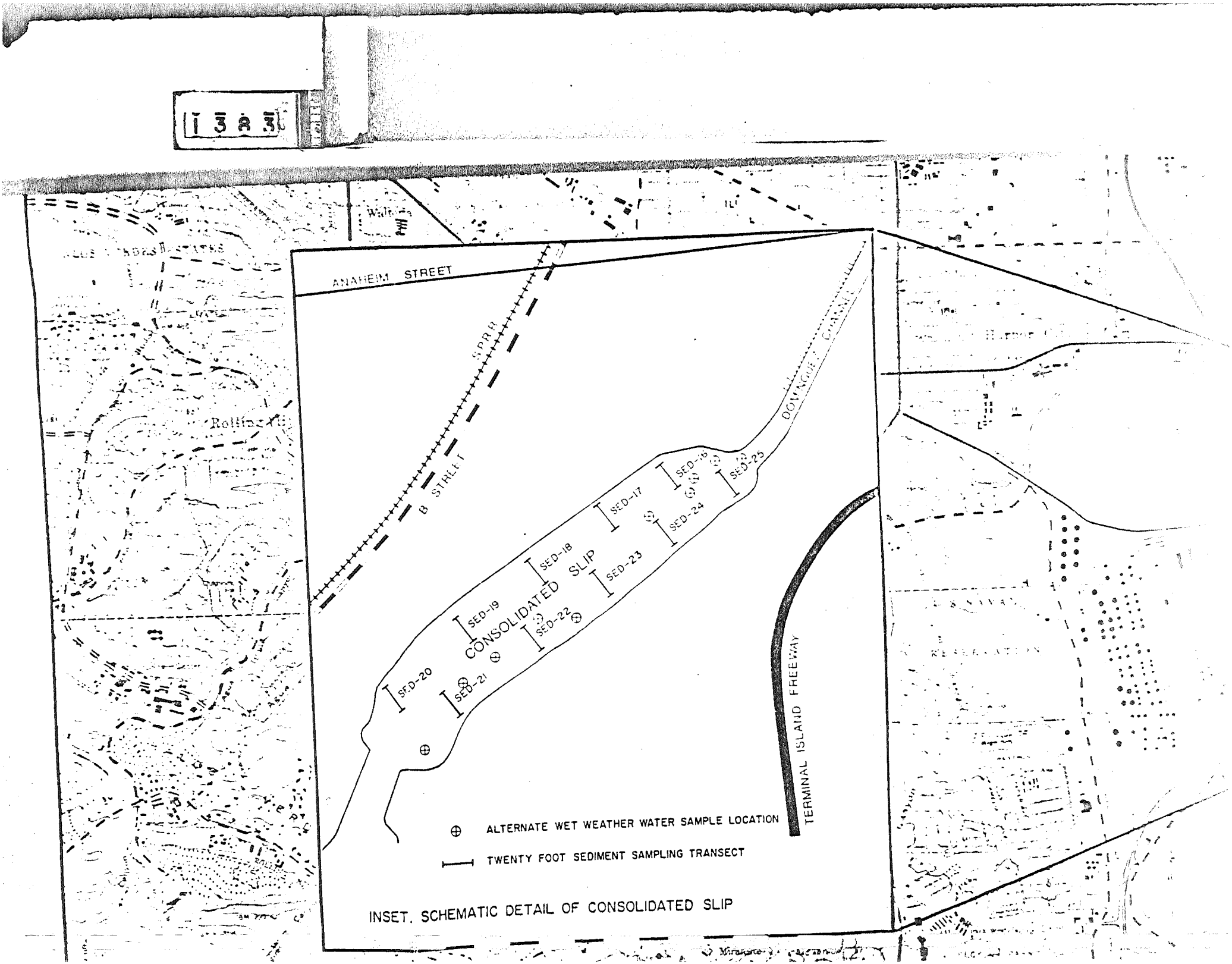
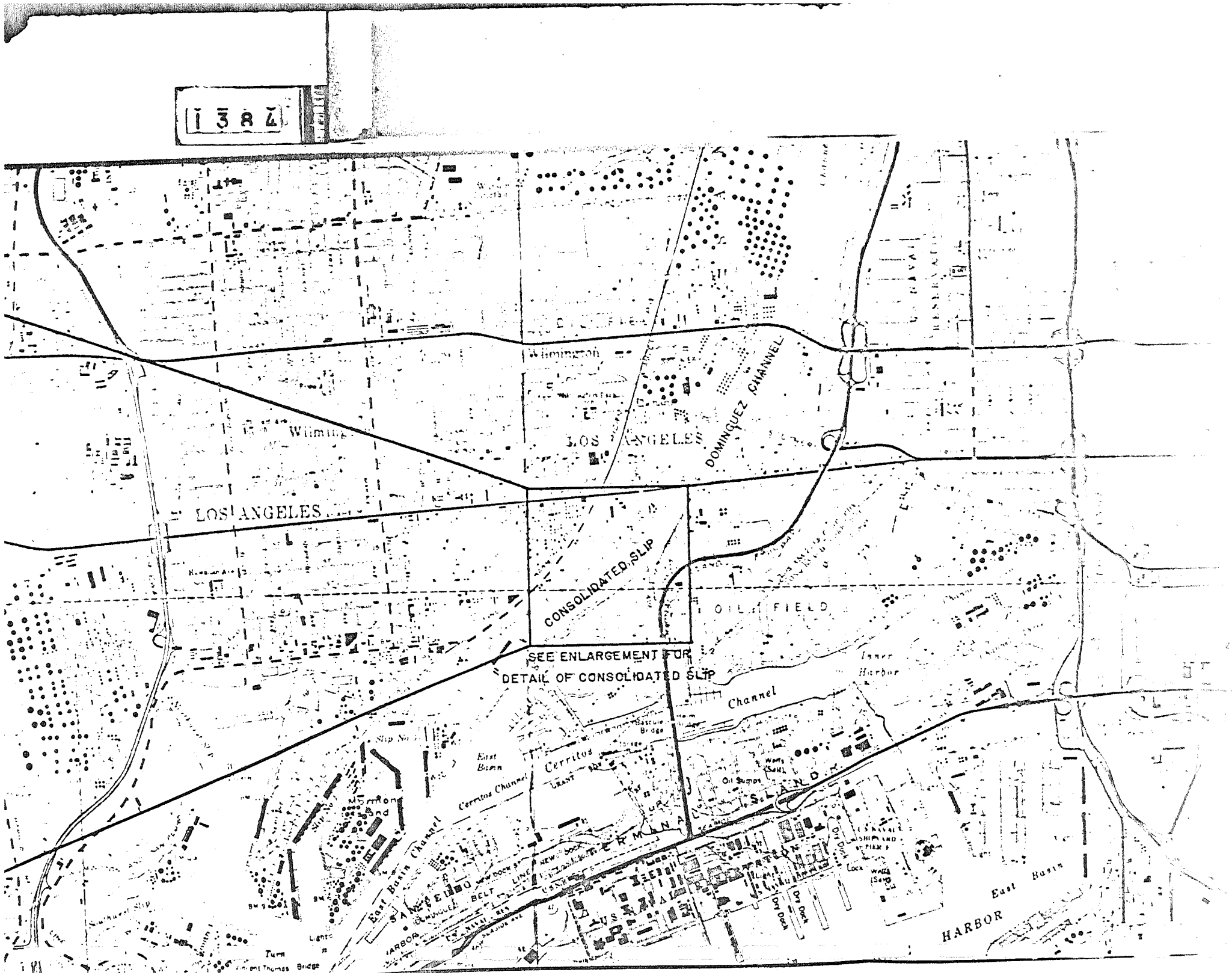
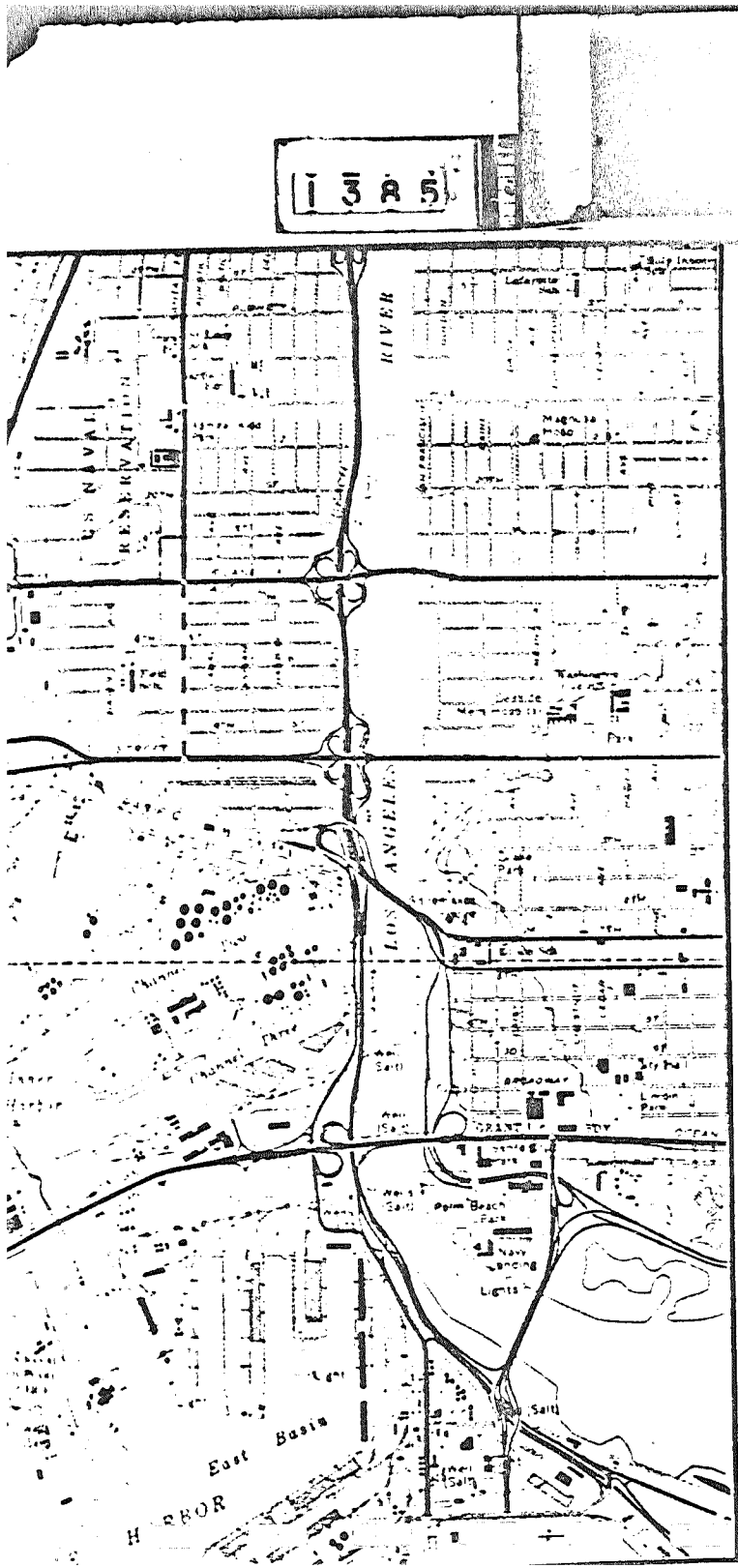
SED-15
US NAVAL
RESERVATION
RIVER







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FEET

MONTROSE CHEMICAL CORPORATION
TORRANCE, CALIFORNIA

SURFACE WATER, SEDIMENT
AND NEIGHBORHOOD
SOIL SAMPLING LOCATIONS

HARGIS + ASSOCIATES, INC. 11/85
Consultants in Hydrogeology
San Diego, California FIGURE 4

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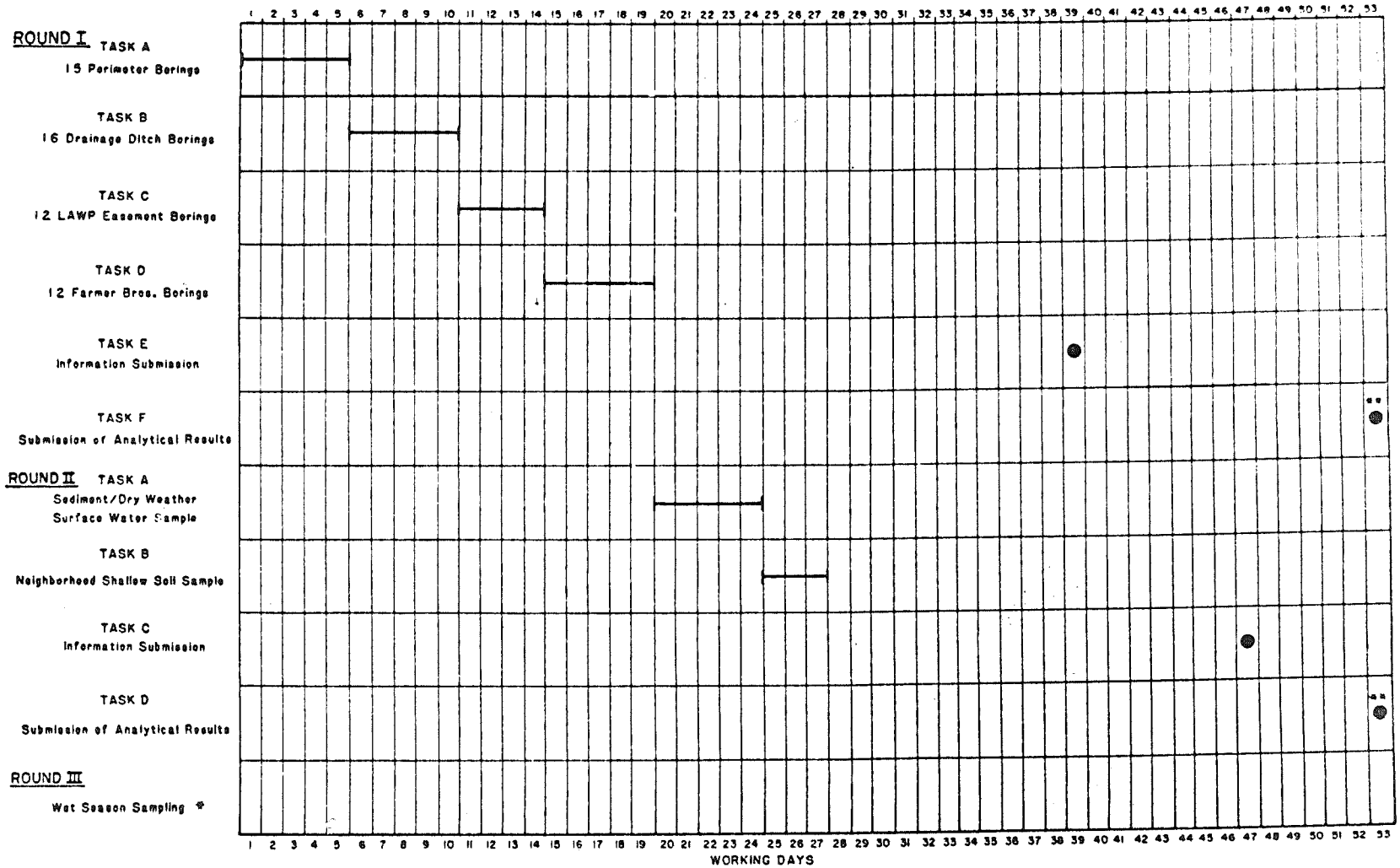

* The collection dates of storm runoff samples are dictated by the occurrence of precipitation events ≥0 20 inches

** As specified in Appendix A of the Consent Order; 45 days total from end of sampling round.

FIGURE 5. PROJECTED WORK SCHEDULE

HARGIS + ASSOCIATES, INC.

APPENDIX A

HEALTH AND SAFETY PLAN

APPENDIX A

CONTENTS

TABLES

ILLUSTRATIONS

HEALTH AND SAFETY PLAN

INTRODUCTION

This Health and Safety Plan has been prepared for the off-site sampling program for the Montrose Chemical Corporation in Torrance, California. Protecting the health and safety of the investigative team, as well as the general public, is a major concern in hazardous waste site remedial investigations. Adherence to the program outlined in this document will reduce the risk of exposure to hazards that may be associated with off-site field activities.

This Health and Safety Plan addresses Target Chemicals specified in the Off-site Sampling Plan. Also, as requested in EPA comments on the H&A Health and Safety Plan submitted in April 1985, this document will describe how personal protective and surveillance equipment will be used.

Per EPA comments dated January 2, 1986 (Theresa Gioia letter to Ed Nemecek re: Comments on the Draft Off-site Sampling Plan and QAPP for the Montrose Chemical Site Near Torrance), and the information presented January 21, 1986 regarding Target Chemicals; this plan includes the following:

1) A hazard assessment discussion of the chemical compounds monochlorobenzene, benzene, dichlorobenzene, chloroform, BHC, and acetone (Table A-1);
2) Specific safety procedures for confined space entry and work (Pages A-18 to A-20);
3) Procedures for establishing background levels in environmental monitoring (Page A-10); and
4) Requirements for disposal of hazardous wastes generated during soil sampling and decontamination procedures.

SITE DESCRIPTION AND HISTORY

The Montrose site occupies about 13 acres in Torrance, California. The site is bounded by a railroad right-of-way and Normandie Avenue on the east, Jones Chemical Company on the south, a vacant lot on the west, and the McDonnell-Douglas facility on the north. The surrounding area consists of mixed residential, commercial, and industrial facilities.

Montrose Chemical Corporation manufactured DDT at the Torrance facility from 1947 to 1982. The facility was closed in 1982 and the site subsequently leveled and paved. Off-site sampling of soils, sediments, and surface water has been conducted by Montrose and its consultants, EPA, DOHS, and California Fish and Game.

The objective of the sampling program is to determine the extent of off-site soil, sediment, and surface water contamination which may have been caused by activities at the Montrose site.

Nine areas have been identified for sampling activities. These areas are listed on page 8 of the main text of this sampling plan. The off-site field activities will include soil sampling, sediment sampling, and surface water runoff sampling.

SITE SAFETY PLAN

- This Site Safety Plan shall be made available to all personnel and posted during the investigation.

- All personnel shall be familiar with standard operating safety procedures and any additional instructions and information contained in the Site Safety Plan.

- All personnel shall adhere to the information contained in the Site Safety Plan.

- All modifications to the Site Safety Plan shall be authorized by the Safety Officer, clearly marked on the posted plan, and explained to all team members.

SAFETY TEAM

The Hargis + Associates, Inc. Safety Coordinator shall designate a Site Safety Officer. The Site Safety Officer shall accompany the investigative team and is responsible for implementing the Site Safety Plan. The Safety Officer reports directly to the Project Manager and shall be experienced in field operations and familiar with the use of air monitoring instrumentation, personal protection equipment, and decontamination procedures. Drilling contractors shall be required to comply with all local, state, and federal regulations in worker protection and shall be experienced in hazardous site investigative work.

PROJECT TEAM

Team Member	Responsibility	Telephone
Dinah H. Jasensky	Safety Coordinator	(602) 881-7300
Matt Wiedland	Safety Officer	(619) 454-0165
Ed Nemecek	Project Manager	(619) 454-0165
Roger Niemeyer	Hydrogeologist	(619) 454-0165

HAZARD EVALUATION

This hazard evaluation is directed toward the Target Chemicals. The Target Chemicals are DDT, BHC, monochlorobenzene, chloroform, acetone, benzene, and dichlorobenzene. Toxicological data for these compounds are summarized in Table A-1, in addition to concentrations measured on-site and off-site during previous investigations. This evaluation has been modified as a result of EPA's selection of Target Chemicals per Appendix A of the consent order.

TABLE A-1

HAZARD ASSESSMENT

CONTAMINANT	ACETONE	BENZENE
MEASURED CONCENTRATION MEDIA	Groundwater[3]	Groundwater[3] (ug/l)
MIN. VAL.	None detected	-5
MAX. VAL.	None detected	3200
EXPOSURE ROUTE	Inhalation, ingestion, contact	Inhalation, absorption, ingestion, contact
HAZARD PROPERTY	Irritant, toxic	Irritant, toxic, carcinogen
HAZARD SPECIFICATIONS PEL[1]	750 ppm	10 ppm
IDLH[2]	20,000 ppm	2,000 ppm
TOXIC EFFECTS	Irritating to eyes, nose, throat; headache; dizziness; dermatitis	ACUTE: irritating to eyes, nose, respiratory system; headache, dizziness, nausea; CHRONIC: bone marrow depression and aplasia; rarely, leukemia
SYNERGISTIC EFFECTS	Unknown	Unknown
TARGET ORGANS	Respiratory system, skin	Blood, CNS, skin, bone marrow, eyes, respiratory system

1. PEL = Maximum permitted 8-hr. time-weighted average concentration of an airborne contaminant (29 C.F.R. 1910.1000)
2. IDLH = The "Immediately Dangerous to Life or Health" concentration
3. Samples collected from on-site monitor wells, April, May, July, 1985

ug/l = micrograms per liter; ppm = parts per million
(-) = less than; numerical value is the limit of detection for that compound in that medium.

References: California Administrative Code, Title 8, Section 5155
Patty's Industrial Hygiene & Toxicology, 3rd Edition, 1981
NIOSH/OSHA Pocket Guide to Chemical Hazards, 1980

TABLE A-1 (continued)
HAZARD ASSESSMENT

CONTAMINANT	BHC (BENZENE HEXACHLORIDE) Isomers: alpha, beta, delta, gamma (Lindane)	CHLOROFORM
MEASURED CONCENTRATION MEDIA	Groundwater3 (ug/l)	Groundwater3 (ug/l)
MIN. VAL.	-5	760
MAX. VAL.	220 (alpha)	24,000
EXPOSURE ROUTE	Ingestion, inhalation (dust or spray), absorption, contact	Inhalation, ingestion, contact
HAZARD PROPERTY	Toxic	Irritant, toxic, carcinogen, teratogen
HAZARD SPECIFICATIONS PEL1	Gamma: 0.5 mg/m3	10 ppm, 50 mg/m3
IDLH2	1,000 mg/m3	1,000 ppm
TOXIC EFFECTS	ACUTE - alpha & gamma: CNS stimulant; hyperexcitability, convulsions; beta: CNS depression; CHRONIC: liver, kidney, and lung damage	Skin and eye irritation; headache; vomiting; dizziness; narcosis; liver injury
SYNERGISTIC EFFECTS	Unknown	Unknown
TARGET ORGANS	Eyes, CNS, blood, liver, kidneys, skin	CNS, liver, kidneys, heart, eyes, skin

1. PEL = Maximum permitted 8-hr. time-weighted average concentration of an airborne contaminant (29 C.F.R. 1910.1000)
2. IDLH = The "Immediately Dangerous to Life or Health" concentration
3. Samples collected from on-site monitor wells, April, May, July, 1985

ug/l = micrograms per liter; mg/m3 = milligrams per cubic meter; ppm = parts per million
(-) = less than; numerical value is the limit of detection for that compound in that medium.

References: California Administrative Code, Title 8, Section 5155
Patty's Industrial Hygiene & Toxicology, 3rd Edition, 1981
NIOSH/OSHA Pocket Guide to Chemical Hazards, 1980

TABLE A-1 (continued)
HAZARD ASSESSMENT

CONTAMINANT	DDT					MONOCHLOROBENZENE	
MEASURED CONCENTRATION MEDIA	Soils[5] (ppm)	Soils[5] (ppm)	Storm water runoff[6] (ppm)	Surface water runoff[6] (ppm)	Groundwater[8] (ug/l)	Groundwater[3] (ppb)	Soils[4] (mg/kg)
MIN. VAL.	NR	0.05	0.0028	---	-0.6	59	-0.3
MAX. VAL.	8,274	2,257	98	0.017297	2,805	180,000	70
EXPOSURE ROUTE	Inhalation, ingestion, absorption, contact					Inhalation, ingestion, contact	
HAZARD PROPERTY	Toxic					Irritant, toxic	
HAZARD SPECIFICATIONS PEL[1]	1 mg/m^3					75 ppm, 350 mg/m^3	
IDLH[2]	N/A					2,400 ppm	
TOXIC EFFECTS	Vomiting; apprehension; excitement; muscle weakness; equilibrium disturbance; convulsions; tremors					Eyes, nose and skin irritation; depression of CNS	
SYNERGISTIC EFFECTS	Synergistic effects shown in animal studies from DDT with aldrin and carbon tetrachloride					Unknown	
TARGET ORGANS	CNS, liver, kidneys, skin, peripheral nervous system					CNS, liver, kidneys, respiratory system, eyes, skin	

1. PEL = Maximum permitted 8-hr. time-weighted average concentration of an airborne contaminant (29 C.F.R. 1910.1000)
2. IDLH = The "Immediately Dangerous to Life or Health" concentration
3. Samples collected from on-site monitor wells, April and May 1985
4. Samples collected off-site, 1981-1983
5. Soil samples collected on-site, April 1985
6. Water samples collected off-site, 1971-1982
7. Mean total concentration, EPA 1982
8. Total concentrations for 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT collected from on-site monitor wells, April, May, July, 1985

NR = not recorded; NA = not applicable; ug/l = micrograms per liter; mg/m^3 = milligrams per cubic meter; ppm = parts per million; ppb = parts per billion
(-) = less than; numerical value is the limit of detection for that compound in that medium.

References: California Administrative Code, Title 8, Section 5155
Patty's Industrial Hygiene & Toxicology, 3rd Edition, 1981
NIOSH/OSHA Pocket Guide to Chemical Hazards, 1980

TABLE A-1 (continued)
HAZARD ASSESSMENT

CONTAMINANT	O-DICHLOROBENZENE	P-DICHLOROBENZENE
MEASURED CONCENTRATION MEDIA	Groundwater[3] (ug/l)	Groundwater[3] (ug/l)
MIN. VAL.	None detected	None detected
MAX. VAL.	13	67
EXPOSURE ROUTE	Inhalation, absorption, ingestion, contact	Inhalation, ingestion, contact
HAZARD PROPERTY	Irritant, toxic	Irritant, toxic
HAZARD SPECIFICATIONS PEL[1]	50 ppm	75 ppm
IDLH[2]		
TOXIC EFFECTS	CNS depression, irritating to eyes, nose; injury to liver, kidney; skin blister	Irritating to skin, throat, eyes; weakness; dizziness; nausea; vomiting; headache; injury to lungs, liver, kidney
SYNERGISTIC EFFECTS	Unknown	Unknown
TARGET ORGANS	Liver, kidneys, skin, eyes	Liver, respiratory system, eyes, kidneys, skin

1. PEL = Maximum permitted 8-hr. time-weighted average concentration of an airborne contaminant (29 C.F.R. 1910.1000)
2. IDLH = The "Immediately Dangerous to Life or Health" concentration
3. Samples collected from on-site monitor wells, April, May, July, 1985

ug/l = micrograms per liter; ppm = parts per million
(-) = less than; numerical value is the limit of detection for that compound in that medium.

References: California Administrative Code, Title 8, Section 5155
Patty's Industrial Hygiene & Toxicology, 3rd Edition, 1981
NIOSH/OSHA Pocket Guide to Chemical Hazards, 1980

MONITORING REQUIREMENTS

The monitoring requirements for the off-site sampling program are based on the hazard evaluation. Monitoring requirements outlined in this section include personal medical surveillance and environmental monitoring during investigative operations.

PERSONNEL MEDICAL SURVEILLANCE

The Hargis + Associates, Inc. investigative team will undergo initial medical screening by a licensed occupational physician to ensure that workers are in good health and have no medical conditions that might put them at an increased risk from this work. Periodic medical examinations will be conducted for all field personnel as part of the Hargis + Associates, Inc. safety program.

Initial screening and periodic exams shall be based upon toxicological data presented in Table A-1, Hazard Evaluation. Examinations include a routine physical, medical history, serum chemistry tests, spirometer tests, and audiometry tests.

ENVIRONMENTAL MONITORING

Field operations at sampling areas numbered 1 through 5 on page 12 will be monitored by an organic vapor analyzer (OVA). Background levels in air shall be established with the OVA in areas well away from the influence of possible chemical releases from sampling activities or from diesel exhaust pipes. Readings exceeding 10 ppm above background will be cause to terminate operations until such time as appropriate safety measures have been taken. The Site Safety Officer shall be responsible for interpreting

monitoring data and upgrading or downgrading the level of protection during entry, drilling, sampling, and decontamination activities.

For sediment sampling in the Kenwood drain, environmental monitoring with a hazardous gas meter for detection of combustible gases, hydrogen sulfide and percent oxygen will be conducted prior to manhole entry and during sampling activities. Instructions for environmental monitoring during these sampling activities are detailed in the section "Procedures for Confined Space Entry and Work", beginning on page A-18.

LEVELS OF PROTECTION

Levels of protection for each sampling site activity are indicated in Table A-2, Levels of Protection. Protection Level D, work uniform with modifications, will be provided for most operations. Results of environmental monitoring, however, may require upgrading of the protection level by the Safety Officer to from Level D to Level C, air-purifying respirators. Protection Level C will be provided for entry to some sampling sites. Supplied-air respirators (5-minute escape packs) and additional equipment will be required for manhole and sewer sampling, as indicated in Table A-2.

Protective equipment that will be provided for sampling activities is listed below.

EQUIPMENT

Respiratory
North #7700-30 half-mask respirator
North #7500-3 organic vapor/acid gas cartridges
North #7500-23 pesticide pre-filters and filter covers
OSHA-approved 5-minute emergency escape pack respirators

Visual
Uvex #9300 dust & chemical goggles

Hearing
Moldex pura-foam ear plugs

Protective Clothing
AF-18 Pioneer lined nitrile gloves
Disposable latex gloves
Poly coated tyvek coveralls, hoods, and booties

Miscellaneous
16 unit first aid kit
SBS barrier cream
Hard hats
Safety vest harness, tripod, and lifeline
Ventilation blower
Traffic cones and barricades
Warning sign

DECONTAMINATION AND DISPOSAL

Decontamination of Personnel and Equipment

Personnel decontamination shall be required prior to all breaks, meals, and at the end of the day. A decontamination station will be established at each sampling area (Figure 2, Site Map). Protective coveralls, booties, hoods and gloves, and used chemical respirator cartridges shall be removed and disposed of in this area. Decontamination of individuals shall be accomplished by soap and water washing followed by a clean rinse at the decontamination station.

Non-disposable protective equipment, such as respirator face masks, sampling tools and other equipment, shall be decontaminated by scrubbing with detergent-water, using a soft-bristled brush followed by a clean water rinse. Clean respirator face masks shall be immediately stored in clean ziplock plastic bags.

If utilized, drill rig augers will be steam cleaned after each use and after final field operations.

Disposal of Investigation-derived Material

Soil cuttings resulting from drilling will be immediately replaced in the borehole and the grade shall be restored with inert material, if necessary. Materials from decontamination operations shall be immediately placed in a container for temporary storage at the Montrose site. The container shall be labeled and stored in a location acceptable to Montrose for the period of analysis of the samples sent to the laboratory. Disposal of the wastes will be the responsibility of Montrose Chemical Corporation.

If wastes derived from investigation activities are determined by laboratory analysis to be hazardous, then disposal of those wastes will be conducted in compliance with EPA's interim policy "Procedure for Planning and Implementing Off-site Response Actions" (Federal Register Vol. 50 No. 214, Tuesday, November 5, 1985), as follows:

Treatment

Treatment, reuse, or recycling of hazardous wastes shall be considered in the removal of investigation-derived hazardous materials. Removal alternatives should not be selected on cost alone, but should consider long-term effectiveness and long- and short-term costs as compared to disposal.

Selection of Off-site Treatment or Disposal Facility

Selection of an appropriate facility for off-site managment of investigation-derived hazardous wastes shall meet the following requirements:

TABLE A-2
LEVELS OF PROTECTION

SAMPLING LOCATIONS AND ACTIVITIES	PROTECTION LEVEL	INSTRUCTIONS FOR PROTECTIVE EQUIPMENT USE
1. Site Perimeter Soil sampling	C[1]	Wear air-purifying respirator and protective clothing upon site entry; interpret OVA monitoring; downgrade to Protection Level D based on OVA monitoring results
2. Utility easement Soil sampling	D[2]	Wear gloves and hard hats; upgrade to Protection Level C if OVA monitoring indicates necessary
3. Normandie Avenue Drainage ditch Soil sampling	D	Wear gloves and hard hats; upgrade to Protection Level C if OVA monitoring indicates necessary
4. Historical drainage area Soil sampling	D	Wear gloves and hard hats; upgrade to Protection Level C if OVA monitoring indicates necessary
5. Kenwood Drain manholes Sediment sampling	B[3]	Wear supplied-air 5-minute escape pack respirators, rubber boots, gloves, and protective clothing; use safety harness, tripod, and lifeline; install traffic barricades; monitor hazardous conditions and use ventilation blowers if necessary; have standby employee. Protection measures for manhole and sewer sample activities are discussed in more detail on pages A-12 - A-16.

1 = Protection Level C: Air-purifying respirator, protective clothing, gloves, hard hat, boots
2 = Protection Level D: Work uniform, hard hat. gloves, boots
3 = Protection Level B: Supplied-air respirators, protective clothing, gloves, hard hats, boots. Although air monitoring may not indicate protection level B, emergency escape respirators will be worn at all times during confined-space entry and work.

TABLE A-2 (continued)
LEVELS OF PROTECTION

SAMPLING LOCATIONS AND ACTIVITIES	PROTECTION LEVEL	INSTRUCTIONS FOR PROTECTIVE EQUIPMENT USE
6. Torrance Lateral Sediment sampling	D	Wear gloves. No drilling, hard hat not necessary.
7. Dominguez Channel Sediment sampling	D	Wear gloves. No drilling, hard hat not necessary.
8. Consolidated Slip Benthic sampling	D	Wear gloves. No drilling, hard hat not necessary.
9. Stream drainage Soil sampling	D	Wear gloves and hard hats; upgrade to Protection Level C if OVA monitoring indicates necessary

1. The owner or operator of any hazardous waste management facility under consideration must have a RCRA permit applicable to specific wastes and specific storage, treatment, or disposal processes.

2. A RCRA compliance inspection must be performed at the off-site facility to receive investigation-derived hazardous wastes not more than six months before receiving such wastes.

3. Any land disposal facility receiving investigation-derived hazardous wastes must meet RCRA minimum technical requirements per the Hazardous and Solid Waste Amendments of 1984. These technical requirements include groundwater monitoring and liner and leachate collection system standards.

Manifest Requirements

Investigation-derived hazardous material transported to an off-site storage, treatment, or disposal site shall be accompanied by a Uniform Hazardous Waste Manifest, in compliance with requirements in 40 CFR 262.

WORK LIMITATIONS

PERSONAL PRECAUTIONS

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated contaminated.

- Hands and face must be thoroughly washed upon leaving the work area.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- No facial hair which interferes with a satisfactory fit of the mask-to-face seal is allowed on personnel required to wear respirators.

- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, or discolored surfaces; kneel on ground; or lean, sit, or place equipment on drums, containers, or the ground.

- Medicine and alcohol can magnify the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel unless specifically approved by a qualified physician.

SITE ACCESS

- Personnel and equipment in the contaminated area shall be minimized, consistent with effective site operations.
- Work areas for drilling and sampling activities are shown in Figures 2 and 4.

PROCEDURES FOR CONFINED SPACE ENTRY AND WORK

Sediment sampling in manholes and sewers shall be conducted according to procedures adopted from Los Angeles County Flood Control District's Safety Manual of Entry, Inspections, and Work in Confined Spaces. These procedures are in accordance with the document NIOSH Criteria for Recommended Standard: Working in Confined Spaces, and with CAL OSHA General Industry Standards for work in confined spaces (Title 8, Sections 51565159), and are as follows:

A. Crew

1. Size - There shall be at least three crew members at each manhole sampling location.
2. Personal Equipment - Each crew member entering a confined space shall be equipped with the following:
   a. Hard hat
   b. Safety vest harness
   c. Approved hand lamp
   d. Gloves
   e. Rubber boots
   f. Five-minute emergency escape pack
   g. Tripod and life line

B. Traffic Barriers and Warning Signs

1. A vehicle with an amber warning light be parked near the opening to a confined space when the opening is in a street, highway, or other traveled area. A warning sign shall be placed near the opening, visible to all traffic.

2. Barricades, traffic cones, and high-rise flags shall be positioned to warn and direct traffic around the standing vehicles.

C. No Smoking

There shall be no smoking within 10 feet of any entrance to a confined space. Smoking shall be prohibited within a confined space.

D. Entry and Exit

Before work is performed in a confined space, provision shall be made for ready entry and exit.

E. Tests

1. The interior of a confined space (both at the surface and invert) must be tested, if possible, before its cover is removed for:
   a. Combustible gas
   b. Carbon dioxide or oxygen deficiency
   c. Carbon monoxide
   d. Hydrogen sulfide

2. If the tests cannot be made before removing the cover, precautions shall be taken while removing the cover. Tests must be made before entry, including the bottom of the confined space by lowering the prove of the explosive gas meter into the manhole.

3. If hazardous gas or a lack of oxygen exists in a confined space, it shall be purged by blowers until conditions are safe as indicated by the gas meter.

F. Life Lines

1. A life line, secured outside, will be attached to the safety harness during descent through a top opening.

2. The life line must remain attached at all times while a worker is in a confined space.

G. Standby Employee and Communications

1. At least one employee shall stand by on the outside of the confined space ready to give assistance in case of emergency. At least one additional employee who may have other duties shall be within sight or call of the standby employees.

2. The standby employee shall have appropriate protective equipment, including an independent source of breathing air available for immediate use.

3. The standby employee(s) may enter the confined space, but only in case of an emergency and only after alerting at least one additional employee outside of the confined space of the existence of an emergency and of the standby employee's intent to enter the confined space.

H. Lighting

Only approved explosion-proof lighting and electrical equipment shall be used in confined spaces subject to dangerous air contamination by flammable or explosive substances.

EMERGENCY PROCEDURES

In the Event of Personal Exposure

- Call the Safety Officer to the scene immediately.
- Immediately remove any clothing that becomes contaminated. Promptly wash with soap and flush with clean water.

- Determine the material involved.
- Don't expose self or others to the materials unnecessarily. Stay upwind, control access to the area, and wear the appropriate protective equipment.
- Remove people from the contaminated area. Wear the appropriate protective equipment and don't charge in blindly. Administer first aid, if necessary.
- If the incident warrants, the Safety Officer must call the appropriate emergency services. See the list of emergency phone numbers in the next section. The emergency care facility is indicated on Figure A-1.
- Record information on the exposure.

In the Event of Personal Injury

- Call the Safety Officer to the scene immediately.
- Remove people from dangerous area or equipment.
- Administer first aid, if necessary.
- If the incident warrants, the Safety Officer must call the appropriate emergency services. See the list of emergency phone numbers in the next section.

In the Event of Fire or Explosion

- Evacuate personnel from area of danger.
- Call Safety Officer to the scene.
- Administer first aid if necessary.
- The Safety Officer shall:
  - notify the Fire Department.
  - contact the local hospital immediately when a major fire starts, advising them of the chemicals involved and the Poison Control Center to be contacted.
  - Call the Montrose emergency coordinator.
  - Keep personnel out of the smoke or mist created by the fire and hose streams. Immediately evacuate areas in the path of smoke.
- See emergency phone numbers in following section.

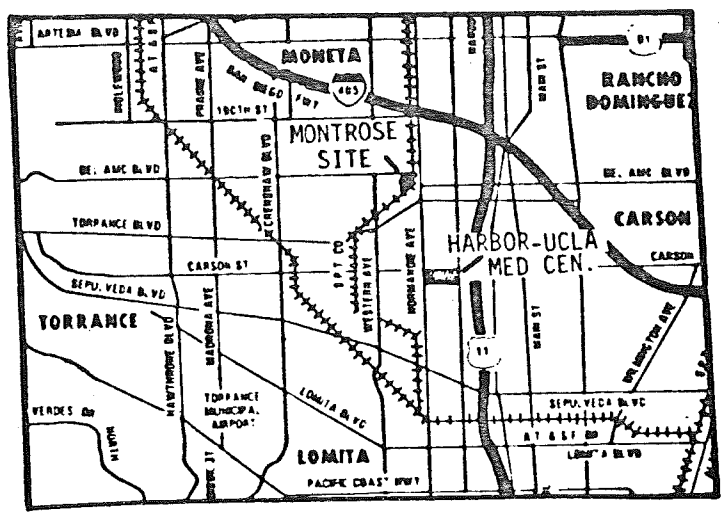

FIGURE A-1. LOCATION OF EMERGENCY FACILITY

EMERGENCY SERVICES

Ambulance:	328-3131 (paramedics)
Hospital Emergency Room:	Harbor-UCLA Medical Center 1000 West Carson Torrance, California 533-2383
Poison Control Center:	Los Angeles County Medical Association 484-5151
Police:	3300 Civic Center Drive Torrance, California 320-2611
Fire Department:	1701 Crenshaw Boulevard Torrance, California 328-3131
Airport:	Torrance, California 325-0191
Explosives Unit:	N/A
Client Contact:	(213) 323-2056 (John Kallok)

The location of the emergency care facility is shown on Figure A-1.

APPENDIX B

HISTORICAL SAMPLING RESULTS

APPENDIX B

CONTENTS

HISTORICAL SAMPLING RESULTS

A review of the available soil and water sampling data indicates the following:

1. Soils around the perimeter of the site were sampled by Montrose Chemical Corporation in August and October 1981. The concentration of DDT ranged from 5.5 ppm (parts per million) to 1,950 ppm.

2. Soils in the utility easement area south of the site were sampled and analyzed by Montrose Chemical Corporation, Jones Chemical Company, and by consultants to Montrose. Concentrations of total DDT detected in the soils in the utility easement area are summarized as follows:

DATE SAMPLED	SAMPLED BY	RANGE IN TOTAL DDT CONCENTRATION (ppm)
August 1981	Montrose Chemical Corp.	5.5 to 101
August 1981	Jones Chemical Company	13 to 160
October 1981[a]	Montrose Chemical Corp.	120
June 1983[b]	Hargis & Montgomery, Inc.	15 to 84
August 1983[b]	Hargis & Montgomery, Inc.	31 to 250
August 1983[c]	Hargis & Montgomery, Inc.	0.70 to 1,900

[a] Only one sample collected and analyzed.
[b] Surface soils.
[c] Depth of two feet.

3. Soils in the drainage ditch adjacent to Normandie Avenue from Montrose to Farmers Brothers catchment basin have been sampled and analyzed by Montrose Chemical Corporation, Jones Chemical Company, the California

Department of Health Services, the California Department of Fish and Game, the EPA, and by consultants to Montrose. Concentrations of total DDT in the soils in the drainage pathway are summarized as follows:

DATE SAMPLED	SAMPLED BY	RANGE IN TOTAL DDT CONCENTRATION (ppm)
August 1981	Montrose Chemical Corp.	927 to 1,833
August 1981	Jones Chemical Company	1,100 to 2,500
November 1981	Montrose Chemical Corp.	780 to 3,200
November 1981[a]	Cal. Dept. of Fish & Game	8,274
November 1982	EPA	24 to 1,975
June 1983[b]	Hargis & Montgomery, Inc.	8.5 to 990
June 1983[c]	Hargis & Montgomery, Inc.	1.5 to 2,400
August 1983[d]	Hargis & Montgomery, Inc.	0.086 to 210
August 1983[e]	Hargis & Montgomery, Inc.	0.080 to 3.0

[a] No range given, just maximum value.
[b] Surface soils.
[c] Depth interval one to two feet.
[d] Depth interval surface to two feet.
[e] Depth interval three to five feet.

4. Surface soils in residential areas in the vicinity of the Montrose site have been sampled by the DOHS as part of the Del Amo investigation in 1983. Soils were sampled in the backyards of houses located along 204th Street, in the 900, 1000, 1100, and 1200 blocks. Results of this sampling indicated total DDT concentrations in surface soils ranging from none detected to 5.1 ppm.

5. Stormwater runoff in drainage pathways leaving the site have been sampled by Montrose Chemical Corporation, California Department of Fish and Game, and by the EPA.

Concentrations of total DDT in the storm-water runoff samples are summarized as follows:

DATE SAMPLED	SAMPLED BY	RANGE IN TOTAL DDT CONCENTRATION (ppm)
February 1981	Montrose Chemical Corp.	0.0028 to 98
November 1981[a]	Montrose Chemical Corp.	4.4
November 1981[a]	Cal. Dept. of Fish & Game	1.4
January 1982[a]	Montrose Chemical Corp.	0.13
November 1982	Montrose Chemical Corp.	0.009 to 3.26
November 1982	EPA	.187 to .695

[a] Only one sample collected and analyzed.

6. Sewer effluent samples have been sampled by Montrose Chemical Corporation and the County Sanitation District of Los Angeles (CSDLA). Sewer sediment samples collected in 1971 by CSDLA downstream from the Montrose site indicated concentrations ranging from 130,000 ppm to 390,000 ppm. Sewer effluent samples collected by Montrose during the period 1974 to 1976 indicated concentrations of DDT ranging from less than 0.0005 ppm to 0.09 ppm. Sewer effluent samples collected by the CSDLA in September 1980 indicated total DDT concentrations ranging from 0.54 to 2,435 ppm.

7. Surface water runoff samples in the Torrance Lateral were collected by the Los Angeles County Flood Control District from 1977 to 1982. The mean concentration of total DDT during dry weather was 0.00075 ppm and during wet weather was 0.00588 ppm. Samples collected by the EPA in November 1982 at the "Project 685" sampling point along the Torrance Lateral drainage system indicated a total DDT concentration of 0.01729 ppm.

APPENDIX C

LOCAL CLIMATOLOGICAL DATA FOR LOS ANGELES INTERNATIONAL AIRPORT AND LOS ANGELES CIVIC CENTER

Local Climatological Data

Annual Summary With Comparative Data

1977

LOS ANGELES, CALIFORNIA
INTERNATIONAL AIRPORT

Narrative Climatological Summary

Predominating influences on the climate of the Los Angeles International Airport are the Pacific Ocean, 3 miles to the west; the southern California coastal mountain ranges which line the inland side of the coastal plain surrounding the airport, and the large scale weather patterns which allow Pacific storm paths to extend as far south as the Los Angeles area only during late fall, winter, and early spring. Marine air covers the coastal plain most of the year but air from the interior reaches the coast at times, especially during the fall and winter months. The coast ranges act as a buffer to the more extreme conditions of the interior. Pronounced differences in temperature, humidity, cloudiness, fog, sunshine, and rain occur over fairly short distances on the coastal plains and the adjoining foothills due to the local topography and the decreased marine effect further inland. In general, temperature ranges are least and humidity highest close to the coast, while precipitation increases with elevation on the foothills.

The most characteristic feature of the climate of the coastal plain around the station is the night and morning low cloudiness and sunny afternoons which prevail during the spring and summer months and occur often during the remainder of the year. Combined with the westerly sea breeze at Los Angeles International Airport, the coastal low cloudiness is associated with mild temperatures throughout the year. Daily temperature range is usually less than 15° in spring and summer but increases to around 20° in fall and winter. Hot weather is not frequent at any season along the coast, although readings have exceeded 85° at the airport occasionally in every month of the year when air from the interior reached the coast. When high temperatures do occur the humidity is almost always low so that discomfort is unusual. Nighttime temperatures are generally cool but minimum temperatures below 40° are rare and periods of over 10 years have passed with no readings below freezing at the airport. Prevailing daytime winds are from the west, but night and early morning breezes are usually light and from the east and northeast. Strongest winds observed at the station have been from the west and north following winter storms. At times during the fall, winter, and spring, gusty dry northeasterly "Santa Ana" winds blow over southern California mountains and through passes to the coast, but very rarely reach Los Angeles International Airport. The extremely dry air and the dust clouds associated with them can be expected at the station several times each year, however.

Precipitation occurs mainly in the winter. Measurable rain may fall on an average of about one day in four from late October into early April, but in three years out of four traces or less are reported for the entire months of July and August. Thunderstorms do not occur often near the coast, but showers and thunderstorms are observed over the coastal ranges at times during the summer when moist air from the south and southeast invades southern California. Annual rainfall at Los Angeles International Airport is somewhat less than that recorded on the Palos Verdes Hills rising to an elevation of near 1,500 feet on a peninsula 12 miles to the south, and on the Hollywood Hills and Santa Monica Mountains which extend east-west 12 miles north of the station with peaks reaching to near 2,000 feet. Traces of snow have fallen at Los Angeles International Airport only a few times, melting as they fell. Snow is visible on mountains from 30 to 100 miles to the east and northeast, however, at times every winter.

Visibility at Los Angeles International Airport is frequently restricted by haze, fog, or smoke. Low visibilities are favored by a layer of moist marine air with warm dry air above. Lowest visibilities usually occur with weak winds, but at times a moderate afternoon sea breeze will bring a fog bank ashore and over the airport. Light fog occurs at sometime nearly every month, but heavy fog is observed least during the summer and can be expected on about one night or early morning in four during the winter.

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA SERVICE / NATIONAL CLIMATIC CENTER ASHEVILLE, N.C.

Meteorological Data For The Current Year

Station: LOS ANGELES, CALIFORNIA 0 23174 INTERNATIONAL AIRPORT Standard time used: PACIFIC Latitude 33° 56' N Longitude 118° 24' W Elevation (ground) 97 feet Year 1977

Month	Temp. °F Average Daily maximum	Daily minimum	Monthly	Extremes Highest	Date	Lowest	Date	Degree days Base 65 °F Heating	Cooling	Precipitation in inches Water equivalent Total	Greatest in 24 hrs.	Date	Snow, Ice pellets Total	Greatest in 24 hrs.	Date	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22	Wind Resultant Direction	Resultant Speed m.p.h.	Average speed m.p.h.	Peak gust Speed m.p.h.	Direction	Date	Percent of possible sunshine	Average sky cover tenths, sunrise to sunset	Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	Max. 90° and above (b)	Max. 32° and below	Min. 32° and below	Min. 0° and below	Average station pressure mb. Elev. 104 feet m.s.l.
JAN	65.7	49.4	57.6	82	17	41	11	227	3	3.21	1.04	6-7	0.0	0.0		80	69	69	77	34	0.7	5.9	37	S	3		5.0	13	6	12	7	0	3	0	0	0	0	0	1013.8
FEB	70.7	50.5	60.6	88	12	44	27	129	13	0.26	0.18	23	0.0	0.0		79	56	68	78	27	2.4	6.7	35	W	24		6.5	14	6	8	2	0	1	7	0	0	0	0	1015.6
MAR	65.0	47.0	56.0	73	7	40	15	272	0	1.23	0.72	24-25	0.0	0.0		70	53	54	69	27	3.4	6.9	39	N	1		5.8	21	6	4	3	0	1	0	0	0	0	0	1017.9
APR	66.3	53.0	61.1	77	23	48	3	111	1	T	T	2	0.0	0.0		88	70	66	83	25	5.0	7.5	31	SW	25		5.0	12	10	8	0	0	0	2	0	0	0	0	1012.1
MAY	67.9	54.8	61.2	74	20	51	11	115	0	2.89	1.78	8-9	0.0	0.0		87	73	69	83	26	5.8	8.8	37	SE	8		5.5	10	11	10	7	0	3	1	0	0	0	0	1010.8
JUN	71.0	59.2	65.1	70	6	53	12	13	23	T	T	9	0.0	0.0		91	77	71	88	25	6.7	8.9	30	W	19		6.6	9	12	13	0	0	0	0	0	0	0	0	1010.5
JUL	73.4	61.8	68.6	87	27	58	13	1	121	0.00	0.00		0.0	0.0		90	72	69	84	25	6.6	8.1	31	SW	2		3.7	13	12	6	0	0	0	1	0	0	0	0	1010.9
AUG	76.6	65.2	70.9	84	16	61	13	0	193	2.47	2.40	16-17	0.0	0.0		89	76	71	85	25	6.0	7.9	35	W	13		3.9	16	10	5	3	0	0	0	0	0	0	0	1008.8
SEP	76.5	62.8	68.7	80	25	58	17	0	118	T	T	27	0.0	0.0		91	76	70	86	25	5.0	7.5	28	W	16		4.2	13	12	5	0	0	0	4	0	0	0	0	1009.8
OCT	72.0	59.5	66.2	83	7	52	31	19	63	T	T	19	0.0	0.0		93	78	73	87	25	4.5	6.9	23	W	19		5.5	8	21	4	0	0	0	4	0	0	0	0	1010.6
NOV	75.0	54.4	64.7	91	23	48	23	62	62	0.04	0.04	3	0.0	0.0		73	51	56	80	27	1.8	6.9	41	NW	27		4.8	14	7	9	1	0	0	4	1	0	0	0	1012.2
DEC	67.2	54.0	60.9	80	1	43	19	120	5	3.02	1.01	23-24	0.0	0.0		83	72	75	81	10	0.4	5.4	32	W	21		7.0	6	9	18	9	0	0	6	0	0	0	0	1013.3
YEAR	70.0	56.1	63.3	91	NOV 23	40	MAR 15	1069	602	13.08	2.40	AUG 16-17	0.0	0.0		85	69	68	81	25	3.9	7.3	41	NW	NOV 27		4.9	149	120	102	32	0	8	30	1	0	0	0	1011.8

Normals, Means, And Extremes

Month	Temp. °F Normal Daily maximum	Daily minimum	Monthly	Extremes Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F Heating	Cooling	Precipitation in inches Water equivalent Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, Ice pellets Maximum monthly	Year	Maximum in 24 hrs.	Year	Relative humidity pct. Hour 04	Hour 10	Hour 16	Hour 22	Wind Mean speed m.p.h.	Prevailing direction	Peak gust Speed m.p.h.	Direction	Year	Pct. of possible sunshine	Mean sky cover tenths, sunrise to sunset	Sunrise to sunset Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, Ice pellets 1.0 inch or more	Thunderstorms	Heavy fog, visibility 1/4 mile or less	Max. 90° and above (b)	Max. 32° and below	Min. 32° and below	Min. 0° and below	Average station pressure mb. Elev. 104 feet m.s.l.
(a)				42		42					42		42		42		42		42		10	10	10	10	39	28	37	37			39	42	42	42	42	42	33	43	18	18	18	18	5
J	63.9	45.4	54.5	88	1970	23	1937	331	3	2.32	9.00	1969	0.00	1976	6.19	1956	T	1974	T	1974	69	56	59	69	6.6	W	48	SW	1951		6.1	12	8	11	6	0	*	3	0	0	0	0	1014.7
F	64.1	47.0	55.6	93	1963	32	1942	270	7	2.32	11.07	1962	T	1966	4.16	1962	T	1951	T	1951	74	58	62	72	7.3	W	57	W	1953		6.0	12	8	11	6	0	*	4	*	0	0	0	1014.9
M	64.3	48.6	56.5	95	1964	34	1939	267	0	1.71	5.98	1938	0.00	1959	3.34	1968	0.0		0.0		78	60	65	74	8.0	W	62	W	1952		5.0	12	8	11	3	0	*	4	0	0	0	0	1012.3
A	65.9	51.7	58.8	95	1966	39	1942	193	9	1.10	4.32	1965	0.00	1962	1.88	1960	0.0		0.0		80	60	61	74	8.4	WSW	59	W	1957		4.8	11	9	10	3	0	*	3	*	0	0	0	1012.2
M	68.4	55.3	61.9	97	1936	43	1938	114	17	0.08	2.35	1977	0.00	1943	1.72	1977	0.0		0.0		83	66	66	80	8.2	WSW	49	W	1952		5.3	10	11	10	1	0	*	2	*	0	0	0	1010.6
J	70.3	58.6	64.5	100	1957	48	1950	71	56	0.03	0.40	1966	0.00	1971	0.29	1966	0.0		0.0		86	70	68	83	7.9	WSW	32	W	1954		5.2	9	11	10	1	0	*	2	*	0	0	*	1009.3
J	74.8	62.1	68.5	97	1959	49	1942	19	127	0.01	0.15	1969	0.00	1977	0.19	1969	0.0		0.0		86	68	68	83	7.7	WSW	31	SW	1977		4.1	12	13	6	1	0	*	2	*	0	0	0	1009.9
A	75.8	63.2	69.5	98	1955	51	1948	15	154	0.02	2.47	1977	0.00	1971	2.40	1977	0.0		0.0		88	69	69	83	7.6	WSW	33	SE	1959		3.9	13	13	6	*	0	*	3	*	0	0	0	1009.9
S	75.7	61.6	68.7	110	1963	47	1948	23	134	0.07	4.39	1939	0.00	1968	4.20	1939	0.0		0.0		84	67	68	81	7.2	WSW	28	W	1977		4.3	13	10	7	1	0	*	4	1	0	0	0	1009.4
O	72.9	57.5	65.2	106	1961	41	1942	77	83	0.22	2.84	1936	0.00	1969	1.77	1972	0.0		0.0		80	60	63	78	6.8	W	46	W	1974		4.4	13	10	8	2	0	*	5	2	0	0	0	1011.3
N	69.6	51.3	60.5	101	1966	34	1939	158	23	1.76	7.92	1946	0.00	1956	5.00	1967	0.0		0.0		75	57	63	73	6.5	W	63	W	1953		4.3	14	8	8	3	0	*	4	1	0	0	0	1013.1
D	66.3	47.3	56.9	94	1958	32	1966	267	0	1.75	6.97	1936	T	1963	3.01	1951	T	1971	T	1971	71	55	61	70	6.4	W	49	S	1952		4.7	13	8	10	5	0	*	4	0	0	0	*	1014.6
YR	69.8	54.1	61.7	110	SEP 1963	23	JAN 1937	1819	613	11.30	11.07	FEB 1962	0.00	JUL 1977	6.19	JAN 1956	T	JAN 1974	T	JAN 1974	79	62	65	77	7.4	W	62	W	MAR 1952		4.7	144	113	108	35	0	4	44	5	0	*	0	1011.9

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

STATION LOCATION

LOS ANGELES, CALIFORNIA
INTERNATIONAL AIRPORT

Location	Occupied from	Occupied to	Airline distance and direction from previous location	Latitude North	Longitude West	Elevation above Sea level: Ground at temperature site	Elevation above Ground: Wind instruments	Elevation above Ground: Extreme thermometers	Elevation above Ground: Psychrometer	Elevation above Ground: Teletypsychrometer	Elevation above Ground: Tipping bucket rain gage	Elevation above Ground: Weighing rain gage	Elevation above Ground: 8" rain gage	Elevation above Ground: Hygrothermometer	Elevation above Sea level: Barometer	Remarks
COOPERATIVE																
Inglewood High School	1/01/19	?/?/28		33° 58'	118° 22'	125		a18					a18			For Los Angeles County Flood Control District.
Inglewood Fire Dept.	?/?/28	4/30/39	1/8 mile NW	33° 58'	118° 22'	125		a30					a30			a - Estimated.
AIRPORT																
Los Angeles Airport (Mines Field) Hangar #1	12/13/31	1/21/43		33° 56'	118° 23'	97	77	29	29				7			Rain gage installed 1/1/36. 1 - Correct for major portion of period.
Los Angeles Municipal Airport, Hangar #1	1/21/43	3/27/44	No Change	33° 56'	118° 23'	97	60	25	25				7			2 - Correct for major portion of period.
Los Angeles Municipal Airport	3/27/44	4/07/47	350 feet E	33° 56'	118° 23'	97	58	4	6				5			
Los Angeles International Airport	4/07/47	9/22/59	3/4 mile N	33° 56'	118° 23'	99	59	30	30	4	27				126	Teletypsychrometer installed 2/18/49.
Los Angeles International Airport	9/22/59	6/21/68	No Change	33° 56'	118° 23'	97	20	30	30		27			5	126	Hygrothermometer and wind equipment commissioned 1/2 mile SW of observatory.
International Airport 10445 S Sepulveda Blvd.	6/21/68	4/11/72	3/4 mile W	33° 56'	118° 24'	97	a20	a19	a19		16			a5	125	a - Same site as prior to 6/21/68.
Weather Service Building International Airport 10445 S Sepulveda Blvd.	4/11/72	Present	90 feet N	33° 56'	118° 24'	97	b20	a5	a5		4	c6	c4	b5	119	b - Same site as prior to 4/11/72. a - Standby status. c - Added 11/26/74.

Requests for additional climatic information should be addressed to: Director, National Climatic Center, Federal Building, Asheville, N. C. 28801

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I certify that this is an official publication of the National Oceanic and Atmospheric Administration, and is compiled from records on file at the National Climatic Center, Asheville, North Carolina 28801.

Director, National Climatic Center

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FIRST CLASS

Local Climatological Data

Annual Summary With Comparative Data

1977

LOS ANGELES, CALIFORNIA

CIVIC CENTER

Narrative Climatological Summary

The climate of Los Angeles is normally pleasant and mild through the year. The Pacific Ocean is the primary moderating influence, but coastal mountain ranges lying along the north and east sides of the Los Angeles coastal basin act as a buffer against extremes of summer heat and winter cold occurring in desert and plateau regions in the interior. A variable balance between mild sea breezes, and either hot or cold winds from the interior, results in some variety in weather conditions, but temperature and humidity are usually well within the limits of human comfort. An important, and somewhat unusual, aspect of the climate of the Los Angeles metropolitan area, is the pronounced difference in temperature, humidity, cloudiness, fog, rain, and sunshine over fairly short distances.

These differences are closely related to the distance from, and elevation above, the Pacific Ocean. Both high and low temperatures become more extreme and the average relative humidity becomes lower as one goes inland and up foothill slopes. On the coast and in the lower coastal plain, average daily temperature ranges are about 15° in summer and 20° in winter, but in foothill and inland valley communities these ranges increase to about 30° in summer and 25° in winter. Relative humidity is frequently high near the coast, but may be quite low along the foothills. During periods of high temperatures, the relative humidity is usually below normal so that discomfort is rare, except for infrequent periods when high temperatures and high humidities occur together.

Like other Pacific Coast areas, most rainfall comes during the winter with nearly 85 percent of the annual total occurring from November through March, while summers are practically rainless. As in many semiarid regions, there is a marked variability in monthly and seasonal totals. Annual precipitation may range from less than a third of the normal value to nearly three times normal, while some customarily rainy months may be either completely rainless, or receive from three to four times the average for the month. Precipitation generally increases with distance from the ocean from a yearly total of around 12 inches in coastal sections to the south of the City up to over 20 inches in foothill areas. Destructive flash floods occasionally develop in and below some mountain canyons. Snow is often visible on nearby mountains in the winter, but is extremely rare in the coastal basin. Thunderstorms are infrequent.

Prevailing winds are from the west during the spring, summer, and early autumn, with northeasterly wind predominating the remainder of the year. Average wind speeds are rather low. At times, the lack of air movement, combined with a frequent and persistent temperature inversion, is associated with concentrations of air pollution in the Los Angeles coastal basin and some adjacent areas. In fall, winter, and early spring months, occasional foehn-like descending (Santa Ana) winds come from the northeast over ridges and through passes in the coastal mountains. These Santa Ana winds may pick up considerable amounts of dust and reach speeds of 35 to 50 m.p.h. in north and east sections of the City, with higher speeds in outlying areas to the north and east, but rarely reach coastal portions of the City.

Sunshine, fog, and clouds depend a great deal on topography and distance from the ocean. Low clouds are common at night and in the morning along the coast during spring and summer, but form later and clear earlier near the foothills so that average annual cloudiness and fog frequencies are greatest near the ocean, and sunshine totals are highest on the inland side of the City. The sun shines about 75 percent of daytime hours at the Civic Center. Light fog may accompany the usual night and morning low clouds, but dense fog is more likely to occur during the night and early morning hours of the winter months.

noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / ENVIRONMENTAL DATA SERVICE / NATIONAL CLIMATIC CENTER ASHEVILLE, N.C.

Meteorological Data For The Current Year

Station: LOS ANGELES, CALIFORNIA (CIVIC CENTER) — Standard time used: PACIFIC — Latitude 34° 03' N — Longitude 118° 14' W — Elevation (ground): 270 feet — Year: 1977

Month	Temperature °F: Averages: Daily maximum	Daily minimum	Monthly	Extremes: Highest	Date	Lowest	Date	Degree days Base 65 °F: Heating	Cooling	Precipitation in inches: Water equivalent: Total	Greatest in 24 hrs.	Date	Snow, ice pellets: Total	Greatest in 24 hrs.	Date	Relative humidity, pct: Hour 04 (Local time)	Hour 10 (Local time)	Hour 16 (Local time)	Hour 22 (Local time)	Wind: Resultant: Direction	Speed m.p.h.	Average speed m.p.h.	Fastest mile: Speed m.p.h.	Direction	Date	Percent of possible sunshine	Average sky cover tenths, sunrise to sunset	Number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets .10 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperature °F: Maximum: 90° and above	32° and below	Minimum: 32° and below	0° and below	Average station pressure mb: Elev. feet msl.
JAN	67.0	48.1	58.1	82	17	40	11	819	3	2.86	1.27	8-7	0.0	0.0									15	NE	26	69	5.6	10	11	10								
FEB	74.5	51.8	63.1	88	18	43	23	686	39	0.17	0.12	23	0.0	0.0									21	NE	21	88	3.2	11	9	8								
MAR	68.5	47.1	58.0	81	21	41	28	847	3	1.69	1.06	24-25	0.0	0.0									16	SW	30	77	4.4	17	7	7								
APR	73.1	54.1	63.7	85	23	48	1	57	23	0.00	0.00		0.0	0.0									28	SW	27	77	5.4	12	11	7								
MAY	69.7	54.9	61.9	81	31	50	17	108	18	3.03	2.41	8-9	0.0	0.0									19	SW	19		5.8	5	22	4								
JUN	77.9	60.9	69.2	86	9	56	19	1	125	0.00	0.00		0.0	0.0									16	SW	16		6.6	7	21	2								
JUL	84.9	64.1	74.5	97	26	57	13	0	293	0.00	0.00		0.0	0.0									13	SW	26		3.6	17	10	4								
AUG	83.6	67.3	75.4	91	20	62	11	0	336	2.29	2.22	16-17	0.0	0.0									14	SW	26	96	3.5	15	15	1								
SEP	80.2	63.3	71.8	99	7	58	18	0	210	0.00	0.00		0.0	0.0									14	SW	29	88	3.9	13	16	1								
OCT	78.9	59.8	69.0	88	8	52	31	16	148	0.00	0.00		0.0	0.0									22	NW	6	97	2.9	11	13	7								
NOV	77.8	54.7	66.3	92	25	48	23	51	96	0.08	0.08	9	0.0	0.0																								
DEC	68.9	53.1	60.8	81	1	44	19	132	8	4.70	2.12	27-28	0.0	0.0																								
YEAR	76.1	56.6	65.9	97	JUL 26	40	JAN 11	911	1314	14.97	2.41	MAY 8-9	0.0	0.0														31	0			11	0	0	0				

Normals, Means, And Extremes

Month	Temperatures °F: Normal: Daily maximum	Daily minimum	Monthly	Extremes: Record highest	Year	Record lowest	Year	Normal Degree days Base 65 °F: Heating	Cooling	Precipitation in inches: Water equivalent: Normal	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Snow, ice pellets: Maximum monthly	Year	Maximum in 24 hrs.	Year	Relative humidity pct.: Hour 04 (Local time)	Hour 10 (Local time)	Hour 16 (Local time)	Hour 22 (Local time)	Wind: Mean speed m.p.h.	Prevailing direction	Fastest mile: Speed m.p.h.	Direction	Year	Pct of possible sunshine	Mean sky cover tenths, sunrise to sunset	Mean number of days: Sunrise to sunset: Clear	Partly cloudy	Cloudy	Precipitation .01 inch or more	Snow, ice pellets .10 inch or more	Thunderstorms	Heavy fog, visibility ¼ mile or less	Temperatures °F: Max.: 90° and above	32° and below	Min.: 32° and below	0° and below	Average station pressure mb: Elev. feet msl.
(a)				97		27					57		57		57		57			57	17	10	28	11	24	29	36	30		32	14	34	34	34	37	37	28	29	37	37	37	37		
J	66.3	46.6	56.7	88	1971	28	1949	868	10	3.00	14.94	1969	0.00	1976	6.11	1956	0.3	1949	0.3	1949	63	51	90	69	6.8	NE	49		1966	69	4.4	14											
F	67.6	48.9	58.3	91	1971	35	1949	707	14	2.77	12.62	1941	T	1964	4.02	1944	9	1951	T	1951	71	54	92	70	6.9	NE	47		1966	72	4.7	12											
M	68.6	49.8	59.2	94	1972	39	1976	690	10	2.19	8.14	1941	0.00	1959	3.61	1943	0.0		0.0		76	53	94	74	6.6	E	40		1959	70	4.7	12	10										
A	70.5	52.9	61.7	99	1966	39	1975	624	25	1.27	6.02	1963	0.00	1977	2.09	1956	0.0		0.0		81	56	95	75	6.3	E	40		1959	68	4.9	11	12										
M	73.2	56.1	64.7	102	1967	46	1964	460	91	0.13	3.03	1977	0.00	1970	2.41	1977	0.0		0.0		89	59	96	78	5.7	E	32		1949	65	4.3	14	11										
J	76.8	59.5	68.0	106	1973	50	1953	338	119	0.03	0.32	1964	0.00	1977	0.32	1964																											
J	82.9	63.9	73.2	103	1959	55	1972	0	258	0.06	0.03	1969	0.00	1977	0.03	1969	0.0		0.0		84	54	93	79	9.4	E	31		1947	82	2.7	21											
A	83.7	64.6	74.1	103	1967	59	1953	0	282	0.04	2.26	1977	0.00	1975	2.23	1977	0.0		0.0		86	58	93	79	9.3	E	28		1965	83	2.6	22											
S	82.3	62.8	72.7	110	1949	51	1948	9	236	0.19	2.82	1976	0.00	1977	1.83	1976	0.0		0.0		78	53	94	76	8.0	E	42		1941	78	3.0	18											
O	78.0	58.7	68.4	104	1958	41	1971	83	140	0.29	1.33	1941	0.00	1977	0.62	1941	0.0		0.0		81	49	89	62	6.4	E	44		1958	74	3.7	17											
N	73.2	52.1	62.7	100	1966	39	1976	113	44	2.02	9.68	1965	0.00	1975	4.07	1970	T	1967	T	1967	82	49	90	62	6.6	NE	44		1965	71	4.2	15											
D	68.0	48.1	58.1	89	1958	32	1951	218	0	2.16	8.97	1971	T	1963	5.98	1969																											
YR	76.3	55.3	65.8	110	SEP 1958	28	JAN 1949	3269	1185	14.09	16.94	JAN 1969	0.00	OCT 1977	6.11	JAN 1956	0.3	JAN 1949	0.3	JAN 1949	79	53	93	72	6.2	N	40	N	JAN 1949	73	4.0	184	106	76	34	0	0	17	20	0	0	0		

Means and extremes above are from existing and comparable exposures. Annual extremes have been exceeded at other sites in the locality as follows: Maximum monthly precipitation 15.60 in December 1889; maximum precipitation in 24 hours 7.36 in December 1933; maximum monthly snowfall 3.0 in January 1932; maximum snowfall in 24 hours 2.0 in January 1932.

(a) Length of record, years, through the current year unless otherwise noted, based on January data.
(b) 70° and above at Alaskan stations.
* Less than one half.
T Trace.

NORMALS - Based on record for the 1941-1970 period.
DATE OF AN EXTREME - The most recent in cases of multiple occurrence.
PREVAILING WIND DIRECTION - Record through 1963.
WIND DIRECTION - Numerals indicate tens of degrees clockwise from true north. 00 indicates calm.
FASTEST MILE WIND - Speed is fastest observed 1-minute value when the direction is in tens of degrees.

§ Through 1963).

Σ Through 1964. The station did not operate 24 hours daily. Fog and thunderstorm data may be incomplete.

LOS ANGELES, CA
CIVIC CENTER

Average Temperature

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1938	51.6	56.6	57.6	61.6	65.6	69.6	69.6	73.6	74.6	66.6	62.6	62.6	64.6
1939	57.6	56.6	58.6	63.6	63.6	66.6	70.6	73.6	71.6	67.6	64.6	59.6	64.6
01940	56.6	59.6	61.6	63.6	66.6	66.6	70.6	70.6	69.6	66.6	63.6	61.6	64.9
1941	57.6	58.6	60.6	59.6	67.6	66.6	70.6	71.6	68.6	66.6	63.6	57.6	64.6
1942	58.6	55.6	58.6	59.6	63.6	65.6	71.6	71.6	67.6	67.6	63.6	58.6	63.8
1943	57.6	60.6	58.6	61.6	63.6	66.6	70.6	71.6	70.6	66.6	63.6	58.6	64.2
1944	57.6	59.6	59.6	59.6	63.6	66.6	71.6	71.6	69.6	66.6	63.6	60.6	64.2
1945	57.6	59.6	59.6	59.6	61.6	64.6	71.6	73.6	73.6	67.6	61.6	57.6	63.1
1946	58.6	56.6	57.6	62.6	61.6	68.6	71.6	72.6	73.6	66.6	58.6	56.6	63.2
1947	55.6	59.6	60.6	62.6	64.6	65.6	71.6	72.6	71.6	68.6	59.6	57.6	64.0
01948	58.6	54.6	55.6	60.6	63.6	67.6	71.6	71.6	71.6	66.6	62.6	59.6	63.0
1949	46.6	58.6	56.6	59.6	64.6	67.6	71.6	73.6	69.6	67.6	59.6	59.6	63.3
1950	58.6	56.6	58.6	62.6	62.6	66.6	70.6	70.6	69.6	69.6	62.6	62.6	63.8
1951	58.6	56.6	60.6	60.6	63.6	66.6	72.6	71.6	71.6	66.6	61.6	56.6	63.6
1952	52.6	58.6	59.6	61.6	64.6	65.6	72.6	74.6	74.6	67.6	59.6	56.6	63.6
1953	60.6	58.6	58.6	59.6	63.6	66.6	70.6	70.6	69.6	63.6	59.6	56.6	64.6
1954	55.6	56.6	57.6	60.6	63.6	67.6	70.6	73.6	72.6	65.6	61.6	58.6	64.9
1955	58.6	57.6	61.6	61.6	63.6	66.6	70.6	74.6	74.6	66.6	61.6	55.6	63.7
1956	56.6	59.6	60.6	58.6	64.6	69.6	71.6	71.6	74.6	66.6	67.6	60.6	64.8
1957	56.6	60.6	61.6	61.6	64.6	72.6	75.6	76.6	72.6	67.6	60.6	61.6	65.7
1958	59.6	60.6	56.6	63.6	66.6	71.6	72.6	73.6	73.6	74.6	63.6	62.6	67.1
1959	60.6	59.6	64.6	66.6	69.6	71.6	77.6	75.6	78.6	68.6	66.6	60.6	67.8
1960	54.6	57.6	62.6	63.6	67.6	70.6	73.6	73.6	73.6	68.6	60.6	58.6	65.7
1961	62.6	61.6	60.6	64.6	65.6	68.6	74.6	74.6	71.6	67.6	60.6	56.6	65.3
1962	57.6	59.6	59.6	64.6	62.6	66.6	70.6	74.6	70.6	65.6	60.6	57.6	63.2
1963	59.6	62.6	58.6	59.6	64.6	64.6	72.6	73.6	72.6	67.6	60.6	60.6	63.1
1964	56.6	59.6	59.6	60.6	61.6	64.6	71.6	73.6	70.6	70.6	59.6	56.6	63.6
1965	58.6	58.6	59.6	61.6	63.6	64.6	70.6	71.6	69.6	69.6	63.6	58.6	64.3
1966	59.6	56.6	61.6	64.6	64.6	70.6	74.6	73.6	73.6	71.6	63.6	60.6	66.0
1967	59.6	62.6	61.6	64.6	67.6	66.6	73.6	73.6	72.6	66.6	65.6	58.6	66.5
1968	58.6	63.6	62.6	64.6	65.6	69.6	74.6	74.6	69.6	69.6	63.6	59.6	66.2
1969	58.6	54.6	59.6	63.6	66.6	67.6	73.6	73.6	69.6	69.6	59.6	58.6	65.4
1970	57.6	61.6	61.6	60.6	67.6	70.6	73.6	74.6	68.6	69.6	63.6	57.6	66.1
1971	58.6	59.6	60.6	62.6	64.6	68.6	74.6	74.6	74.6	69.6	60.6	58.6	65.1
1972	55.6	60.6	63.6	63.6	67.6	70.6	76.6	77.6	72.6	67.6	62.6	58.6	66.9
1973	56.6	60.6	57.6	63.6	63.6	72.6	73.6	70.6	69.6	68.6	60.6	59.6	65.0
1974	59.6	59.6	59.6	64.6	63.6	72.6	74.6	72.6	73.6	67.6	64.6	58.6	65.9
1975	57.6	55.6	59.6	58.6	62.6	69.6	73.6	71.6	74.6	68.6	61.6	57.6	64.0
1976	59.6	56.6	58.6	57.6	64.6	71.6	72.6	71.6	72.6	70.6	64.6	60.6	65.2
1977	58.6	63.6	58.6	63.6	61.6	69.6	74.6	73.6	73.6	69.6	64.6	60.6	65.9
RECORD MEAN	59.6	57.6	59.6	60.6	63.6	67.6	71.6	72.6	70.7	66.6	62.6	57.6	63.6
MAX	65.6	64.6	67.6	70.6	72.6	76.6	81.6	82.6	81.6	76.6	72.6	67.6	73.6
MIN	46.6	47.6	49.6	51.6	54.6	57.6	61.6	61.6	60.6	56.6	51.6	46.6	53.6

Heating Degree Days

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1957-58	0	0	0	16	121	112	164	130	246	82	13	0	884
1958-59	0	0	0	0	60	132	139	237	49	29	26	0	700
1959-60	0	0	0	2	29	149	319	324	111	69	24	0	918
1960-61	0	0	22	139	196	116	111	146	74	61	11	0	876
1961-62	0	0	2	37	161	243	248	309	290	66	57	30	1406
1962-63	0	0	0	35	139	220	286	181	292	161	97	24	1219
1963-64	0	0	0	0	51	103	149	230	169	211	169	36	1157
1964-65	0	0	0	9	186	236	274	196	189	168	70	38	1366
1965-66	0	0	0	1	98	264	281	244	176	58	36	0	1186
1966-67	0	0	0	0	88	143	179	81	139	100	43	29	803
1967-68	0	0	0	0	32	287	207	79	90	70	50	7	822
1968-69	0	0	0	0	76	247	219	277	168	68	23	1	1129
1969-70	0	0	22	92	108	222	106	188	134	27	1	0	870
1970-71	0	0	0	8	72	243	295	186	194	127	77	11	1213
1971-72	0	0	0	94	153	369	288	332	81	61	33	0	1410
1972-73	0	0	0	14	97	230	266	139	214	77	33	21	1060
1973-74	0	0	1	0	156	174	350	160	171	94	32	1	1037
1974-75	0	0	29	73	268	243	234	283	262	79	21	1	1506
1975-76	0	0	0	31	132	247	190	266	215	219	80	12	1392
1976-77	0	0	0	0	62	138	215	86	247	97	108	1	954
1977-78	0	0	0	14	91	192							

Cooling Degree Days

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
1969	19	0	30	39	81	73	276	327	209	100	65	19	1279
1970	0	11	17	17	106	159	326	332	197	118	28	16	1427
1971	71	28	16	46	50	121	291	423	296	176	17	0	1597
1972	0	4	27	34	122	229	409	391	229	89	21	25	1570
1973	3	2	0	25	64	220	336	272	157	139	9	21	1148
1974	3	3	8	31	98	223	288	235	234	119	53	2	1299
1975	21	0	0	0	11	48	241	223	277	82	26	4	933
1976	22	3	20	10	32	203	245	212	233	185	123	2	1290
1977	7	39	9	29	18	139	295	334	210	148	96	6	1314

Precipitation

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
1938	1.65	9.01	7.94	0.48	0.08	T	0.00	T	0.05	0.01	T	7.26	27.16
1939	2.96	1.13	1.44	0.24	0.02	T	T	0.01	3.65	0.13	0.00	0.38	12.06
01940	4.33	3.46	1.55	1.01	0.02	T	T	0.00	0.01	1.47	0.34	5.50	20.26
1941	2.21	12.42	8.14	2.67	T	T	T	0.04	0.00	1.58	0.05	4.22	31.28
1942	0.39	1.05	1.26	2.44	T	T	0.00	0.22	T	0.38	0.24	1.01	7.00
1943	7.98	3.07	4.55	0.58	T	0.01	T	0.00	T	0.18	0.05	4.28	22.57
1944	0.97	8.68	2.47	0.60	0.00	0.00	T	T	0.01	0.04	3.72	0.90	17.49
1945	0.04	3.34	3.42	0.08	T	0.01	T	0.04	T	0.96	0.28	3.05	10.78
1946	0.11	1.92	3.84	0.44	0.04	T	T	0.00	0.00	0.92	6.04	3.49	16.22
1947	0.38	0.86	0.78	0.04	0.12	0.00	0.00	0.01	0.00	0.14	0.06	1.68	4.15
1948	T	1.29	3.07	0.78	T	0.18	T	T	T	0.04	T	2.20	7.39
1949	2.43	1.41	1.48	T	0.48	T	T	0.01	0.01	0.01	2.18	2.73	10.63
1950	2.57	1.67	0.87	0.56	T	T	0.01	0.00	0.38	0.24	1.05	0.03	7.38
1951	2.80	1.48	0.44	1.34	0.24	T	T	0.15	0.00	0.59	1.28	3.80	14.33
1952	10.03	0.63	0.14	1.38	T	T	T	0.15	0.00	3.15	3.31	24.95
1953	1.08	0.38	0.48	0.91	0.00	0.00	0.00	T	T	1.11	0.00	4.00
1954	4.60	2.98	2.98	0.13	0.02	0.00	T	T	T	3.00	0.84	0.84	19.49
1955	4.30	0.68	0.56	2.87	1.48	0.00	T	0.05	T	T	1.08	1.11	11.89
1956	8.39	0.59	T	3.78	0.48	T	0.00	T	0.00	0.12	0.00	0.36	18.62
1957	4.41	1.47	1.02	1.47	0.63	0.00	T	T	0.00	1.31	0.91	2.14	19.26
1958	2.08	0.46	5.30	3.00	0.04	0.00	T	0.39	0.00	0.00	T	T	17.49
1959	1.24	3.32	0.00	0.58	T	T	T	T	0.01	T	0.01	1.08	9.23
1960	2.94	2.26	0.31	1.48	0.05	T	0.00	0.00	T	0.01	2.40	0.13	9.57
1961	1.28	0.15	0.57	0.28	T	T	T	0.00	0.00	T	2.02	1.64	5.83
1962	2.58	11.57	1.10	T	0.00	T	0.00	0.00	0.00	0.12	T	T	19.37
1963	0.58	2.88	2.78	1.94	T	0.14	T	0.00	0.00	1.31	0.59	2.11	12.31
1964	1.48	T	1.78	0.38	0.01	0.38	T	0.00	0.00	0.38	1.72	2.05	7.98
1965	0.88	0.28	2.48	0.08	0.00	0.01	T	0.01	1.00	0.00	0.48	5.78	20.81
1966	0.98	1.91	0.58	0.00	0.28	0.00	T	T	0.30	0.08	4.05	9.28	18.91
1967	5.98	0.11	2.58	3.78	0.01	0.00	0.00	T	1.08	0.00	0.57	1.98	27.69
1968	0.90	0.48	3.34	0.48	0.00	0.03	0.01	0.11	0.01	0.38	0.38	0.38	7.38
1969	14.94	0.08	1.48	0.68	0.00	T	0.00	0.00	T	0.00	1.11	0.06	28.32
1970	1.58	2.58	2.58	0.00	0.00	0.04	0.00	0.00	0.00	0.00	3.08	4.98	16.34
1971	0.48	0.68	0.58	0.58	0.28	0.00	T	0.00	T	0.04	0.78	6.38	9.26
1972	0.00	0.18	T	0.08	0.08	0.00	0.00	0.38	0.01	0.18	3.18	2.38	6.54
1973	4.38	7.88	2.78	0.00	T	0.00	0.00	0.00	0.00	0.18	1.98	0.68	17.48
1974	0.38	0.18	3.78	0.18	0.08	0.00	0.00	0.00	0.00	0.38	0.08	0.38	16.68
1975	0.18	3.34	4.88	1.38	0.08	0.00	0.00	0.00	0.00	0.28	0.00	0.38	10.78
1976	0.00	3.78	1.08	0.68	0.08	0.28	0.00	0.08	2.88	0.28	0.68	0.78	11.01
1977	2.88	0.18	1.88	0.00	3.08	0.08	0.00	2.28	0.00	0.00	0.08	4.78	14.97
RECORD MEAN	3.01	3.01	2.58	1.06	0.38	0.08	0.01	0.05	0.28	0.58	1.38	2.68	14.76

Snowfall

Season	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1970-71	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1971-72	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1972-73	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1973-74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1974-75	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1975-76	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1976-77	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1977-78	0.0	0.0	0.0	0.0	0.0	0.0							
RECORD MEAN	0.0	0.0	0.0	0.0	0.0	T	T	T	0.0	0.0	0.0	0.0	T

# Indicates a station move or relocation of instruments. See Station Location table.

Record mean values above are means through the current year for the period beginning in 1878 for temperature and precipitation, 1941 for snowfall.

REPORT TO U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WASTE PRCGRAMS ENFORCEMENT

REMEDIAL INVESTIGATION WORKPLAN
Second Draft

MONTROSE FACILITY SITE
(TORRANCE, CALIFORNIA)

May 31, 1984

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